minicomputers were 8-bit and 12-bit machines but by 1970s, almost all minicomputers were 16-bit machines. The 16-bit minicomputers have the advantages of large instruction set and address field, efficient storage and handling of text. Thus, a 16-bit minicomputer was a more powerful machine and could be used in variety of applications. It could support business applications along with the scientific ones. With the advancement in technology, the speed, memory size and other characteristics developed and the minicomputer was then used for various stand-alone or dedicated applications. The minicomputer was then used as a multi-user system which can be used by various users at the same time. Gradually, the architectural requirement of minicomputers grew and a 32-bit minicomputer, called "super mini,"- was introduced. The super mini had more peripheral devices, larger memory and could support more users working simultaneously on a computer in comparison to previous minicomputers.

3. Workstation: It is a powerful stand-alone computer of the sort used in computer-aided design and other applications requiring a high-end, expensive machine with considerable calculating or graphics capability. Machines using Intel Processor P2 at 400 MHz is an example of a workstation.

4. Mainframe Computers: They are very powerful, large-scale general-purpose computers. Their word length may be 48, 60 or 64 bits, memory capacity 256 to 512 MB, hard disk capacity 1 to 100 GB or more and processing speed 100 to 200 MIPS. They are used where large amounts of data are to be processed or very complex calculations are to be made. It should be noted that these tasks are beyond the capacities 6f mini computers. They are used in research organizations, large industries, airlines reservation etc. where a large database has to be maintained. Its examples include IBM 4300 series and IBM Enterprise system/9000 series.

5. Super Computers: Its processing capabilities lie in the range of 400-10,000 MIPS, word length 64-96 bits, memory capacity 1024 MB and more, and hard disk capacity 1000 GB and more. It contains a number of CPUs that operate in parallel to make it faster, i.e. CPUs give them their speed through parallel processing. They are used for weather forecasting, weapons research and development, rocketing, aerodynamics, atomic, nuclear and plasma physics. Supercomputers have limited use and limited market because of their very high price. They are being used at some research centers and government agencies involving sophisticated scientific and engineering tasks.

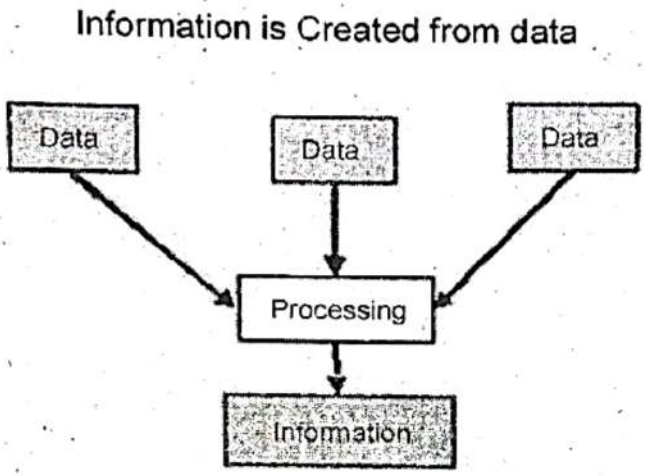
Q.1. (*b*) What is an instruction set?

Ans. An instruction set is a group of commands for a CPU in machine language. The term can refer to all possible instructions for a CPU or a subset of instructions to enhance its performance in certain situations.

All CPUs have instruction sets that enable commands to the processor directing the CPU to switch the relevant transistors. Some instructions are simple read, write and move commands that direct data to different hardware.

Q.1. (*c*) What is difference between data and information?

Ans. Data and information are interrelated. Data usually refers to raw data, or unprocessed data. It is the basic form of data, data that hasn't been analyzed or processed in any manner. Once the data is analyzed, it is considered as information. Information is "knowledge communicated or received concerning a particular fact or circumstance." Information is a sequence of symbols that can be interpreted as a message. It provides knowledge or insight about a certain matter.



Q.1. (*d*) List out and explain some of the important characteristics of a computer.

Ans. Characteristics of Computer

- **SPEED :** In general, no human being can compete to solving the complex computation, faster than computer.
- **ACCURACY :** Since Computer is programmed, so what ever input we give it gives result with accuratly.
- **STORAGE :** Computer can store mass storage of data with appropriate formate.
- **DILIGENCE :** Computer can work for hours without any break and creating error.
- **VERSATILITY :** We can use computer to perform completely different type of work at the same time.
- **POWER OF REMEMBERING :** It can remember data for us.
- **NO IQ :** Computer does not work without instruction.
- **NO FEELING :** Computer does not have emotions, knowledge, experience, feeling.

Q.1. (*e*) What is meant by garbage-in-garbage-out?

Ans. GIGO (garbage in, garbage out) is a concept common to computer science and mathematics: the quality of output is determined by the quality of the input. So, for example, if a mathematical equation is improperly stated, the answer is unlikely to be correct. Similarly, if incorrect data is input to a program, the output is unlikely to be informative. George Fuechsel, an early IBM programmer and instructor, is generally given credit for coining the term. Fuechsel is said to have used "garbage in, garbage out" as a concise way of reminding his students that a computer just processes what it is given. The term is now widely used in computer science classes, IT services and elsewhere. In fact, GIGO is sometimes used to refer to situations in the analog world, such as a faulty decision made as a result of incomplete information.

Q.1. (*f*) What is an input interface? How does it differ from an output interface?

Ans. The input interfaces transform the input data and instructions fed to the computer through its input devices into the binary codes which are acceptable to the computer.

Whereas, the output interfaces transform the information obtained from data processing, from binary form to human acceptable (readable) form.

Q.1. (g) What is the value of the base for decimal, hexadecimal, binary and octal number system?

Ans. Binary Number System : It has only base 2 i.e 0 and 1

Octal Number System : Base of octal is 8 i.e. 0, 1, 2, 3, 4, 5, 6, 7

Decimal Number System : Base of Decimal is 10 i.e. 0 1 2 3 4 5 6 7 8 9

Hexadecimal Number System : Base of this number system is 16

i.e. 0 1 2 3 4 5 6 7 8 9 A B C D E F

Q.1. (h) Define the term 'byte' What is the difference between a bit and a byte.

Ans. At the smallest scale in the computer, information is stored as bits and bytes.

Bit

- a "bit", like an atom, the smallest unit of storage
- A bit stores just a 0 or 1
- "In the computer it's all 0's and 1's" ... bits
- A bit is too small to be much use

Byte

- One byte = grouping of 8 bits
- e.g. 0 1 0 1 1 0 1 0
- One byte can store one character, e.g. 'A' or 'x' or '$'

Q.1. (i) Differentiate between static and dynamic RAMs.

Ans. SRAM (static RAM) is random access memory (RAM) that retains data bits in its memory as long as power is being supplied. Unlike dynamic RAM (DRAM), which stores bits in cells consisting of a capacitor and a transistor, SRAM does not have to be periodically refreshed. Static RAM provides faster access to data and is more expensive than DRAM. SRAM is used for a computer's cache memory and as part of the random access memory digital-to-analog converter on a video card.

Q.1. (j) What is a secondary storage? How does it differ from a primary storage?

Ans. A computer stores data using several different methods. Therefore, there are different levels of data storage, which may be referred to as primary and secondary storage. A computer's internal hard drive is often considered a primary storage device, while external hard drives and other external media are considered secondary storage devices.

However, primary and secondary storage may also refer specifically to the components inside the computer. In this case, primary storage typically refers to random access memory (RAM), while secondary storage refers to the computer's internal hard drive.

RAM, commonly called "memory," is considered primary storage, since it stores data that is directly accessible by the computer's CPU. RAM is a high-speed storage medium that can be accessed with minimal delay. Because the RAM is connected directly to the CPU via the memory bus, the CPU can access data stored in RAM very quickly. For this reason, RAM is used to store data loaded by active programs and the operating system.

Hard drives are considered secondary storage since they are not connected directly to the CPU. Instead, hard drives send and receive data through an I/O bus, which may pass through a cache or other type of memory before getting to the CPU. Also, hard drives are not as fast a RAM, which means they cannot transfer data as quickly. However,

Q.1. (d) Explain transmission modes. (4)

Ans. Data transmission, whether analog or digital, may also be characterized by the direction in which the signals travel over the media. These are as follows:

Refer Q.1 (e) End Term Examination Nov-Dec. – 2018 (Pg. No. 7–2018).

Q.1. (e) Describe ASCII and EBCDIC Codes. (4)

Ans. ASCII:

• **Bit Size**: 7-bit (commonly extended to 8-bit)

• **Number of Characters**: 128 standard characters (with 7 bits), and 256 characters in extended 8-bit ASCII.

• **Character Range**:

(a) ASCII includes English letters (both uppercase and lowercase), digits (0–9), punctuation marks, and control characters.

(b) Standard ASCII ranges from 0 to 127. Extended ASCII, using 8 bits, includes additional characters such as accented letters and symbols.

• **Usage**: Widely used in modern computing systems, programming, and data encoding across various platforms. ASCII is the default character set for text files, web pages, and more.

• **Example**:

(a) Character 'A' is represented as 65 in decimal or 1000001 in binary.

(b) Character 'a' is 97, and '0' is 48.

EBCDIC:

• **Bit Size**: 8-bit

• **Number of Characters**: 256 characters

• **Character Range:** EBCDIC includes a similar set of characters as ASCII (letters, digits, punctuation, and control characters), but it uses a different binary encoding for the characters.

• **Usage**: Primarily used on IBM mainframe and midrange computer systems. EBCDIC is less common in modern systems compared to ASCII, but it's still used in legacy applications.

• **Example**:

(a) Character 'A' in EBCDIC is represented as 193 in decimal or 11000001 in binary.

(b) Character 'a' is 129, and '0' is 240.

Q.1. (f) Briefly describe different types of network. (4)

Ans. Computer networks are classified based on their size, range, and purpose. Here are the main types:

1. PAN (Personal Area Network):

• Range: Within a few meters.

• Usage: Connects personal devices like smartphones, laptops, and tablets.

• Example: Bluetooth connections, connecting a phone to a wireless headset.

2. LAN (Local Area Network):

• Range: Limited to a single building or small geographical area.

• Usage: Connects devices within an organization or home.

• Example: Office network, home Wi-Fi network.

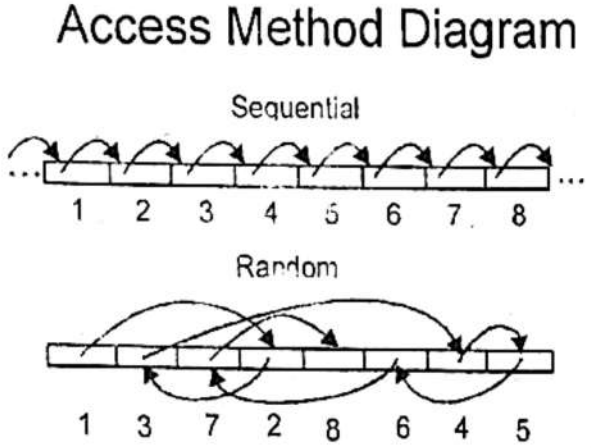
3. MAN (Metropolitan Area Network):

• Range: Spans across a city or large campus.

• Usage: Connects multiple LANs within a city or region.

• Example: City-wide Wi-Fi networks, university campus networks.

A common example of sequential access is with a tape drive, where the device must move the tape's ribbon forward or backward to reach the desired information. The opposite would be RAM (Random Access Memory) that can go anywhere on the chip to access the information.



Q. 3. (b) Differential between Magnetic Tape and Magnetic Hard Disk

Ans. Magnetic tape and magnetic disk both stores the data magnetically. The surface of a magnetic tape and the surface of a magnetic disk are covered with a magnetic material which helps in storing the information magnetically. Both are **non-volatile storage**. Despite these similarities both differs in many aspects from their appearance to their working, their cost and much more.

BASIS	MAGNETIC TAPE	MAGNETIC DISK
Basic	Used for backup, and storage of less frequently used information.	Used as a secondary storage.
Physical	Plastic thin, long, narrow strip coated with magnetic material.	Several platters arranged above each other to form a cylinder, each platter has a read-write head.
Use	Idle for sequential access.	Idle for random access.
Access	Slower in data accessing.	Fast in data accessing.
Update	Once data is fed, it can't be updated.	Data can be updated.
Data loss	If the tape is damaged, the data is lost.	In a case of a head crash, the data is lost.
Storage	Typically stores from 20 GB to 200 GB.	From Several hundred GB to Terabytes.
Expense	Magnetic tapes are less expensive.	Magnetic disk is more expensive.

UNIT-II

Q. 4. (a) Differentiate between Assembler, Compiler and Interpreter. (6.5)

Ans. Compiler:

⇒ Compiler is a translator which translates high level Languages like C, C++ to Machine code.

⇒ Comp er Scans the entire program at once and then converts into Machine code.

⇒ Execution of programs are faster in Compilers.

⇒ Compilers translates error report after translation of entire code.

Examples: gcc compiler which stands for GNU compiler collections, Visual Studio, Intel C++

Interpreter:

⇒ Interpreter is a translator programs which translates high level program into machine level line by line.

⇒ Interpreter first Converts high level language into an intermediate code and then executes it line by line.

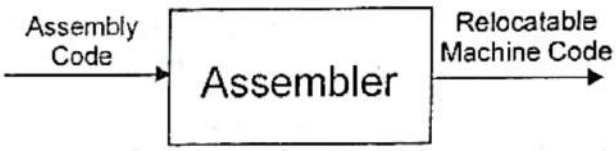
⇒ Translation is a bit slower than compiler.

⇒ In interpreter, an error will be notified but no further code is scanned.

Example: Python

Assembler: Assembler are used to convert assembly language code into machine code. Examples : ACME, AS65 etc

Some compilers perform the task of assembler and directly generate a relocatable machine code instead of assembly code, which is further directly passed to linker/loader. The **assembler** takes as input the assembly code generated by the compiler and translates it into **relocatable machine code.**



However machine code is different from assembly code. **Assembly code** is the **mnemonic** version of machine code. It means it assembly code uses names for representing operations and it even gives names to the memory addresses. On the other hands, the **machine code** uses **binary codes** for representation of operations and memory addresses.

Even the simplest form of assembler performs **two passes** over the input. The **first pass** detects all the **identifiers** in the assembly code that denotes storage location and store them in the **symbol table** (other than compilers symbol table). The **storage location is assigned** to the identifier that is encountered in the first pass.

In the **second pass**, the input is scanned again, and this time the **operation code** are **translated** into a **sequence of bits** representing that operation in the machine code. The second pass also translates **identifiers** into the **addresses** defined in the symbol table. Thus the second pass generates the **relocatable machine code.**

Q. 4. (b) Explain the role of Linker. **(6)**

Ans. Linker: There are certain programs which are large its size and cannot be executed at one go simultaneously. Such programs are divided into subprograms also known as modules. The linker is used to link such small programs to form one large program.

Function of Linker: For most compilers, each object file is the result of compiling one input source code file. When a program comprises multiple object files, the linker combines these files into a unified executable program, resolving the symbols as it goes along.

Linkers can take objects from a collection called a library: Some linkers do not include the whole library in the output they only include its symbols that ale referenced

Examples of Input Devices:

1. Keyboard: A device consisting of keys that allow users to input text and commands into a computer.

2. Mouse: A pointing device that detects two-dimensional motion relative to a surface, allowing users to interact with graphical user interfaces.

3. Scanner: A device that converts physical documents and images into digital format by capturing them for storage or editing on a computer.

Output Devices

Output devices are hardware components that convey information from the computer to the user. They display, print, or project data processed by the computer.

Examples of Output Devices:

1. Monitor: A screen that displays visual output from the computer, such as the operating system interface, applications, and multimedia.

2. Printer: A device that produces a physical copy of digital documents, images, or graphics on paper or other media.

3. Speakers: Audio output devices that convert digital audio signals into sound, allowing users to hear music, notifications, or any audio from the computer.

UNIT-II

Q.4. (a) Define the Operating system. Explain the functions of the Operating System. (5)

Ans. Refer to Q. 4 from End Term Examination February 2023.(Pg. No. 9–2022).

Q.4. (b) Describe the Booting Process in the Operating System. (5)

Ans. The **booting process** in an operating system refers to the sequence of steps a computer follows to load the operating system into memory and start running it after the system is powered on or restarted. There are two types of booting: **Cold booting** (when the system is started from a completely powered-off state) and **Warm booting** (when the system is restarted without being completely turned off).

Steps in the Booting Process:

1. Power On: • When the computer is turned on, power is supplied to the hardware components, and the processor is initialized.

2. POST (Power-On Self-Test):

• The system runs a self-diagnostic called POST to check whether hardware components like the RAM, keyboard, and disk drives are functioning properly.

• If POST detects any errors, it either displays an error message or emits beep codes to indicate the issue.

3. BIOS/UEFI Execution:

• The **BIOS (Basic Input/Output System)** or **UEFI (Unified Extensible Firmware Interface)**, which is firmware stored on the motherboard, is loaded.

• The BIOS/UEFI checks for connected devices (e.g., hard drives, USB devices) and prepares the system for booting.

4. Bootloader Activation:

• After the BIOS/UEFI completes the initial hardware checks, it locates the bootloader, which is typically stored on the bootable drive (usually the hard drive or SSD).

• The bootloader (e.g., GRUB for Linux, Windows Boot Manager for Windows) is a small program responsible for loading the operating system.

5. Operating System Loading:

• The bootloader loads the kernel of the operating system (the core part of the OS) into memory.

• The kernel initializes the rest of the operating system components, manages hardware, and prepares the system for use.

6. System Configuration and Initialization:

• The operating system runs system-level services and drivers to initialize the necessary hardware components like disk drives, keyboards, and displays.

• It also loads system files and configurations, such as user profiles, network settings, and startup programs.

7. User Authentication: • Once the OS is fully loaded, the user is presented with a login screen (if required) to authenticate and start using the system.

8. Desktop Environment/Interface: • After login, the graphical user interface (GUI), such as the desktop environment, is loaded, allowing the user to interact with the operating system.

Cold Boot vs. Warm Boot:

• **Cold Boot**: Starts the computer from an off state, triggering the full boot process.

• **Warm Boot**: Restarts the computer without turning it off, skipping some hardware initialization steps but still following the boot sequence.

The booting process is essential for preparing the system to be operational and for ensuring all hardware and software components are functioning properly.

OR

Q.5. (a) Explain types of Operating Systems. **(5)**

Ans. Batch Operating System: In the 1970s, Batch processing was very popular. In this technique, similar types of jobs were batched together and executed in time. People were used to having a single computer which was called a mainframe. In Batch operating system, access is given to more than one person; they submit their respective jobs to the system for the execution.

The system put all of the jobs in a queue on the basis of first come first serve and then executes the jobs one by one. The users collect their respective output when all the jobs get executed.

The purpose of this operating system was mainly to transfer control from one job to another as soon as the job was completed. It contained a small set of programs called the resident monitor that always resided in one part of the main memory. The remaining part is used for servicing jobs.

Batch Processing is not suitable for jobs that are dependent on the user's input. If a job requires the input of two numbers from the console, then it will never get it in the batch processing scenario since the user is not present at the time of execution.

Multiprogramming Operating System: Multiprogramming is an extension to batch processing where the CPU is always kept busy. Each process needs two types of system time: CPU time and IO time.

In a multiprogramming environment, when a process does its I/O, The CPU can start the execution of other processes. Therefore, multiprogramming improves the efficiency of the system.

Q. 6. (c) Convert 23 from base 10 to base 8.

Ans. $(23)_{10} = (\ )_8$

8	23	
8	2	7
	0	2

Hence $(23)_{10} = (27)_8$

Q. 6. (d) Multiply 101101 by 110.

Ans. $(101101)_2$ by $(110)_2$

```
      101101
         110
-------------
      000000
     101101
    101101
-------------
   100001110
-------------
```

Explanation: Number 1 in the decimal system

$101101_2 = 45_{10}$

Number 2 in the decimal system

$110_2 = 6_{10}$

Their product

$45 * 6 = 270$

Result in binary form

$270_{10} = 100001110_2$

Q. 6. (e) Divide 11010 by 101.

Ans. Divide $(11010)_2$ by $(101)_2$

```
101) 11010 (101
   -101
    00110
  -   101
  -------
      001 [Remainder]
```

Thus the quotient is 101 and the remainder is 011.

Explanation: Number 1 in the decimal system

$11010_2 = 26_{10}$

Number 2 in the decimal syste

$101_2 = 5_{10}$

Their Division 26 / 5 = 5.2

Result in binary for

$5.2_{10} = 101_2$

OR

Q. 7. (a) Differentiate between 1's complement and 2's complement in binary system **(6.5)**

Given A = 123 and B = 55.

Ans. Binary equivalent of 123 and 55 are as below:

$(123)_{10} = (0111\ 1011)_2$

$(55)_{10} = (0011\ 0111)_2$

1's complement of a binary number is another binary number obtained by reve ing all bits in it i.e., transforming the 0 bit to 1 and the 1 bit to 0.

1's complement of 123 (0111 1011) = 132 (1000 0100)

1's complement of 55 (0011 0111) = 200 (1100 1000)

2's complement of a binary number is 1 added to the 1's complement of the binary number.

2's complement of 123 (0111 1011) = 133 (1000 0101)

1's complement of 55 (0011 0111) = 201 (1100 1001)

1's complement of a binary number is another binary number obtained by toggling all bits in it, *i.e.*, transforming the 0 bit to 1 and the 1 bit to 0.

Examples:

Let numbers be stored using 4 bits

1's complement of 7 (0111) is 8 (1000)

1's complement of 12 (1100) is 3 (0011)

2's complement of a binary number is 1 added to the 1's complement of the binary number.

Examples:

Let numbers be stored using 4 bits

2's complement of 7 (0111) is 9 (1001)

2's complement of 12 (1100) is 4 (0100)

These representations are used for signed numbers.

The main difference between 1's complement and 2's complement is that 1's complement has two representations of 0 (zero) – 00000000, which is positive zero (+0) and 11111111, which is negative zero (–0); whereas in 2's complement, there is only one representation for zero – 00000000 (+0) because if we add 1 to 11111111 (-1), we get 00000000 (+0) which is the same as positive zero. This is the reason why 2's complement is generally used.

Another difference is that while adding numbers using 1's s complement, we first do binary addition, then add in an end-around carry value. But, 2's complement has only one value for zero, and doesn't require carry values.

Q. 7. (b) Write short notes on grey and ASCII code. **(6)**

Ans. ASCII: The name ASCII, originally an abbreviation for "American Standard Code for Information Interchange", denotes an old character repertoire, code, and encoding.

Most character codes currently in use contain ASCII as their subset in some sense. ASCII is the safest character repertoire to be used in data transfer. However, not even all ASCII characters are "safe"!

ASCII has been used and is used so widely that often the word ASCII refers to "text" or "plain text" in general, even if the character code is something else! The words "ASCII file" quite often mean any text file as opposite to a binary file.

The definition of ASCII also specifies a set of control codes ("control characters") such as linefeed (LF) and escape (ESC). But the *character repertoire* proper, consisting of the *printable* characters of ASCII, is the following (where the first item is the blank, or space, character):

! " # $ % & ' ( ) * + , - . /

0 1 2 3 4 5 6 7 8 9 : ; < = > ?

@ A B C D E F G H I J K L M N O

P Q R S T U V W X Y Z [\ ] ^ _

Q. 1. (c) Define Telent

Ans. TELNET (**TEL**ecommunication **NET**work) is a network protocol used on the Internet or local area network (LAN) connections. It was developed in 1969 beginning with RFC 15 and standardized as IETF STD 8, one of the first Internet standards.

It is a network protocol used on the Internet or local area networks to provide a bidirectional interactive communications facility. Typically, telnet provides access to a command-line interface on a remote host via a virtual terminal connection which consists of an 8-bit byte oriented data connection over the Transmission Control Protocol (TCP). User data is interspersed in-band with TELNET control information. The user's computer, which initiates the connection, is referred to as the local computer. The computer being connected to, which accepts the connection, is referred to as the remote computer. The remote computer can be physically located in the next room, the next town or in another country.

The network terminal protocol (TELNET) allows a user to log in on any other computer on the network. We can start a remote session by specifying a computer to connect to. From that time until we finish the session, anything we type is sent to the other computer.

The Telnet program runs on the computer and connects your PC to a server on the network. We can then enter commands through the Telnet program and they will be executed as if we were entering them directly on the server console. This enables we to control the server and communicate with other servers on the network. To start a Telnet session, we must log in to a server by entering a valid username and password. Telnet is a common way to remotely control Web servers.

The term **telnet** also refers to software which implements the client part of the protocol.

UNIT–I

Q. 2. (a) Discuss classification of computers. (6)

Ans. Computers can be classified on the basis of different factors like

(i) on working principle and

(ii) on the basis of size and speed.

(i) On working principle :- There are two categories of computers. These are as follows:

1. Analog Computers:- Analog computers are analog devices (refer to figure 1.1). It means that they have continuous states rather than discrete numbered states. An analog computer can represent fractional or irrational values exactly, i.e. with no round off. Analog computers are almost never used outside of experimental settings. They handle or process information which is of physical nature.

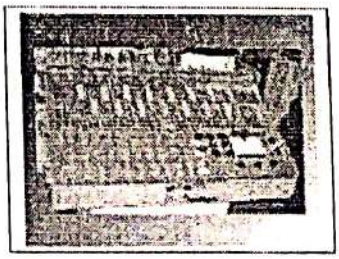


Fig. Analog computers

2. Digital Computers: A digital computer is a programmable-clocked sequential state machine (refer to figure 1.2). It uses discrete states. A binary digital computer uses two discrete states, such as positive/negative, high/low, on/off, to represent the binary digits "zero" and "one." They process information which is essentially in a binary state.

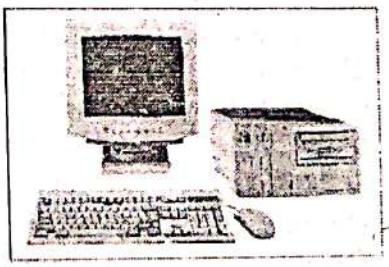


Fig. Digital computers

(ii) On the basis of size and speed:- Computers can also be classified on the basis of size and speed. Based on this classification, five types of computers are as follows:

1. Micro Computers: A microcomputer's CPU is a microprocessor. The microcomputer originated in late 1970s. The first microcomputer was built around 8-bit microprocessor chips. An 8-bit chip is the chip that can retrieve instructions/data from storage, manipulate and process an 8-bit data at a time. One can also say that the chip has a built-in 8-bit data transfer path. 8088 is an 8/16-bit chip, i.e. an 8-bit path is used to move data between chip and primary storage (external path) but processing is done within the chip using a 16-bit path (internal path) at a time. 8086 is a 16/16-bit chip, i.e. both the internal and external paths are 16-bit wide. Both these chips can support a primary storage capacity of upto 1 Mega Byte (MB).

Most of the popular microcomputers are developed around Intel's chips while most of the minis and super minis are built around Motorola's 68000 series chips. There are, however, new trends developing. With the advancement of display and VLSI technology, a microcomputer is now available in a very small size. Some of these are laptops/notebook computers etc. Most of these are of the size of a small notebook but with an equivalent capacity of an older mainframe.

2. Minicomputers: The term "minicomputer" was originated in 1960s when it was realized that many computing tasks do not require an expensive contemporary mainframe computers but can be solved by a small, inexpensive computer also. Initial minicomputers were 8-bit and 12-bit machines but by 1970s, almost all minicomputers were 16-bit machines. The 16-bit minicomputers have the advantages of large instruction set and address field, efficient storage and handling of text. Thus, a 16-bit minicomputer was a more powerful machine and could be used in variety of applications. It could support business applications along with the scientific ones. With the advancement in technology, the speed, memory size and other characteristics developed and the minicomputer was then used for various stand-alone or dedicated applications. The minicomputer was then used as a multi-user system which can be used by various users at the same time. Gradually, the architectural requirement of minicomputers grew and a 32-bit min.computer, called "super mini," was introduced. The super mini had more peripheral devices, larger memory and could support more users working simultaneously on a computer in comparison to previous minicomputers.

3. Workstation: It is a powerful stand-alone computer of the sort used in computer-aided design and other applications requiring a high-end, expensive machine with considerable calculating or graphics capability. Machines using Intel Processor P2 at 400 MHz is an example of a workstation.

4. Mainframe Computers: They are very powerful, large-scale general-purpose computers. Their word length may be 48, 60 or 64 bits, memory capacity 256 to 512 MB, hard disk capacity 1 to 100 GB or more and processing speed 100 to 200 MIPS. They are used where large amounts of data are to be processed or very complex calculations are to be made. It should be noted that these tasks are beyond the capacities of mini computers. They are used in research organizations, large industries, airlines reservation etc. where a large database has to be maintained. Its examples include IBM 4300 series and IBM Enterprise system/9000 series.

5. Super Computers: Its processing capabilities lie in the range of 400-10,000 MIPS, word length 64-96 bits, memory capacity 1024 MB and more, and hard disk capacity 1000 GB and more. It contains a number of CPUs that operate in parallel to make it faster, i.e. CPUs give them their speed through parallel processing. They are used for weather forecasting, weapons research and development, rocketing, aerodynamics, atomic, nuclear and plasma physics. Supercomputers have limited use and limited market because of their very high price. They are being used at some research centers and government agencies involving sophisticated scientific and engineering tasks.

4.	The ownership of LAN is private.	The ownership of MAN might be public or private.	The ownership of WAN might be private or public.
5.	The internet speed of LAN is very high, i.e., 1000 Mbps.	The speed of MAN is moderate, i.e., 44-155 Mbps.	The speed of WAN is relatively less than MAN and LAN, i.e., 150 Mbps.
6.	The maintenance cost of LAN is easy.	The maintenance cost of MAN is difficult.	The maintenance cost of WAN is difficult.
7.	The bandwidth of LAN is high.	The bandwidth of MAN is less.	The bandwidth of WAN is relatively low.

Q.1.(e) Define the Term byte. What is the difference between a bit and byte. **(5)**

Ans. A Byte is a unit of data measurement which mainly consists of eight bits. A byte is a series of binary digits, which contain '0' or '1'. A byte is represented as upper-case 'B' whereas a bit is represented by small-case "b". The symbol of bit and byte is specified in IEC80000-13 and IEEE 1541. It is a term which is introduced in the year 1956 by Werner Buchholz.

A byte is a basic unit of storage capacity in the computer systems. It is also used by computers to represent the characters such as numbers, letters or symbols. A single byte can be used for indicating the 28 or 256 different values. These values start from 00000000 Binary to 11111111 Binary.

The byte is used for measuring the size of memory and the speed of data transfer.

Q.1.(f) Write full form of the following:- (a) GUI (b) CUI (c) BASIC (d) FORTRAN (e) MICR **(5)**

Ans. (a) GUI: Graphical User Interface

(b) CUI: Character User Interface.

(c) BASIC: Beginner's All-purpose Symbolic Instruction Code

(d) FORTRAN: Formula Translation

(e) MICR: Magnetic Ink Character Recognition

UNIT- I

Q.2.(a) What is generation in Computer terminology? Explain various computer generations along with key characteristics of computers of each generation. **(6.5)**

Ans. "Generation" in computer terminology means a step of changing technology. It provides the framework for the growth of computer industry. There are five generations of computer, with the first generation computers being those which became commercially available in the early 1950s.

First Generation Computers (1951-58)

The first generation of computer was marked by the use of vacuum tubes for the electronic components and the use of either electrostatic tubes (i.e. cathode ray tubes) or

mercury delay lines for storage. Examples of such first generation machines are EDSAC (operational in 1949), SEAC (1950, the first stored program computer operational in theUS), EDVAC (1951) and IAS (1952). This generation lasted until the end of 1950s and computers in this era had their basis in wired circuitry and thermionic valves.

Their features were as follows:

- Vacuum tubes circuit
- Drum primary storage
- Batch processing
- Processing speed-- few thousand instructions per second
- Language used-- machine language
- Produced large amount of heat
- Very expensive
- Poor reliability
- ENIAC, EDVAC, EDSAC, UNIVAC are some of the first generation computers.
- Quite large and, because they generated a lot of heat, required special housing.
- The medium of internal storage was magnetic drum.

Second Generation Computers (1959-64)

The second generation machines were initially marked by either magnetic drum or magnetic core storage and later by the use of transistor in place of vacuum tubes. The second generation, which covered the first half of the 1960s, saw the introduction of printed circuits and the replacement of vacuum by transistors. Typical computers were the ICT (ICL) 1300 and the IBM 140J.

The features of this generation are as follows:

- Transistors and diodes were used
- Magnetic primary storage
- Tape secondary storage
- Processing speed-- one million instructions per second
- Language used-- Assembly and Fortran
- Very expensive
- Better reliability
- Faster than the faster generation
- Reduced generated heat
- Required less power to operate
- Increased storage capacity

Third Generation Computers (1965-75)

The arrival of the third generation in mid-1960s proved to be an important milestone in the evolution of computers. The advances over the previous generation

were very significant and, although relatively expensive, allowed an increasing number of organizations to reap the undoubted benefits which computerization could bring. Because of the high costs involved and the need to get maximum utilization from the machine, the computer service bureau business was spawned. This, in itself, was important as it allowed companies to avail themselves the new technology and to take advantage of continuing developments. Many of the computers acquired by companies during this period are still in use.

The following are the features of this generation:

- Magnetic disk secondary storage
- Online real time processing
- Used operating system
- Multiprogramming operating system
- Development of the micro computer
- Integrated circuits
- Faster than the previous generation of computers
- Batter storage storage device (tape)
- Improved input and output device
- Transistor replaced by integrated circuits
- IBM- 370 and NCR 395 were the third-generation computers

Fourth Generation Computers (1975 till date)

The fourth generation of computers arrived in mid-1970s. The distinguishing marks were the introduction of standard architecture for greater mobility of systems, the introduction of micro technology and significant software developments. The IBM-4300 and ICL-2900 ranges coincided with the start of this era. Micro technology gave rise to the availability of microcomputers, word processors and intelligent terminals.

The features of this generation are as follows:

- Further reductions in the size of the hardware
- Better price and performance
- Large scale and very large scale integrated circuits (LSI/VLSI)
- Semi-conductor primary storage
- Online real time processing
- User friendly software
- Widespread use of CRT terminals
- Development of electronic spreadsheet
- High level languages
- Microprocessor used
- Increased cost of software
- Database management system

- Distributes processing
- Graphics manipulation
- Pentium/AMD based

Fifth Generation Computers (Future)

It is very difficult to define the fifth generation of computers. The most famous example of this generation computer is fictional HAL9000 from Arutur C. Clarke's novel. HAL performed all the functions currently envisioned for real time fifth generation computer.

Its features include the following:

- Organic chips
- Decreasing cost of software
- Decreasing cost of hardware
- Artificial intelligence
- Multi-point input-output
- Large storage facility
- Auto decision
- High speed

Q.2. (b) Explain the following: –

(i) Data

(ii) Information

(iii) RAM

(iv) ROM

(v) CPU

(vi) Auxillary Memory **(6)**

Ans. (i) & (ii)Data and Information: Data is a collection of numbers, characters, alphabets and special symbols etc. that can be processed to produce some meaningful information. The word "data" is a plural of "datum." But data is commonly used to represent both the singular and plural form. "Data is commonly defined as raw facts or observations." These facts can be from physical processes, business transactions, surveys, investigations etc. For example, if a person has already been to Mount Everest, he or she would be able to provide a lot of data to other people planning to visit the Mount Everest. Data are the objective measurements of the attributes of entities such as place, people, things and events. These measurements are usually represented by symbols such as numbers and words or by codes composed of a mixture of numerical, alphabetical and other characters. However, data commonly takes a variety of forms including numeric data, text, voice and images. Data and information are often used interchangeably. But it is helpful to view data as raw material. This data, when processed, gets converted into finished information product.

Data is usually not useful until subjected to a value added process. This process includes the following:

balanced and cancel each other out. Centrifugal force is the rotational force placed on the satellite that wants to fling it out into space

The uplink is the transmitter of data to the satellite. The downlink is the receiver of data. Uplinks and downlinks are also called Earth stations because they are located on the Earth. The footprint is the "shadow" that the satellite can transmit to, the shadow being the area that can receive the satellite's transmitted signal.

Q. 8. (b) Differentiate between Digital and Analog Transmission. **(6.5)**

Ans. Digital and Analog Transmission

Analog (or analogue) transmission is a transmission method of conveying voice, data, image, signal or video information using a continuous signal which varies in amplitude, phase, or some other property in proportion to that of a variable. It could be the transfer of an analog source signal, using an analog modulation method such as Frequency modulation (FM) or Amplitude modulation (AM), or no modulation at all.

Data transmission, digital transmission, or **digital communications** is the physical transfer of data (a digital bit stream) over a point-to-point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibres, wireless communication channels, and storage media. The data are represented as an electromagnetic signal, such as an electrical voltage, radiowave, microwave, or infrared signal.

	Analog	Digital
data	continu us (e.g., voice)	discrete (e.g., text)
signal	continuous electromagnetic waves Used mainly for transmitting data across a network.	sequence of voltage pulses  Used mainly internally within computers.
transmission	transmission of analog signals without regards to their content (the data may be analog or binary). The signals become weaker (attenuated) with the distance. Amplifiers may be used to strengthen the signals, but as side effect they also boost the noise. This might not be a problem for analog data, such as voice, but is a problem for digital data.	Transmission that is concerned with the content of the signal. Repeaters are used to overcome attenuation. A repeater recovers the digital pattern from the signal it gets, and resubmits a new signal.

(6.5)

Q. 9. (a) Explain Client-Server architecture.

Ans. The client/server architecture significantly decreased network traffic by providing a query response rather than total file transfer. It allows multi-user updating through a GUI front end to a shared database. Remote Procedure Calls (RPCs) or standard query language (SQL) statements are typically used to communicate between the client and server.

The following are the examples of client/server architectures.

(1) **Two tier architectures** A two-tier architecture is where a client talks directly to a server, with no intervening server. It is typically used in small environments(less than 50 users).

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In two tier client/server architectures, the user interface is placed at user's desktop environment and the database management system services are usually in a server that is a more powerful machine that provides services to the many clients. Information processing is split between the user system interface environment and the database management server environment.

(2) **Three tier architectures** The three tier architecture is introduced to overcome the drawbacks of the two tier architecture. In the three tier architecture, a middleware is used between the user system interface client environment and the database management server environment.

These middleware are implemented in a variety of ways such as transaction processing monitors, message servers or application servers. The middleware perform the function of queuing, application execution and database staging. In addition the middleware adds scheduling and prioritization for work in progress.

The three tier client/server architecture is used to improve performance for large number of users and also improves flexibility when compared to the two tier approach.

The drawback of three tier architectures is that the development environment is more difficult to use than the development of two tier applications.

The basic characteristics of client/server architectures are:

(1) Combination of a client or **front-end portion** that interacts with the user, and a server or **back-end portion** that interacts with the shared resource. The client process contains **solution-specific logic** and provides the interface between the user and the rest of the application system. The server process acts as a **software engine** that manages shared resources such as databases, printers, modems, or high powered processors.

(2) The front-end task and back-end task have fundamentally different requirements for computing resources such as processor speeds, memory, disk speeds and capacities, and input/output devices.

(3) The environment is typically **heterogeneous** and multivendor. The hardware platform and operating system of client and server are not usually the same. Client and server processes communicate through a well-defined set of standard application program interfaces (API's) and RPC's.

(4) An important characteristic of client-server systems is scalability. They can be scaled horizontally or vertically. Horizontal scaling means adding or removing client workstations with only a slight performance impact. Vertical scaling means migrating to a larger and faster server machine or multi-servers.

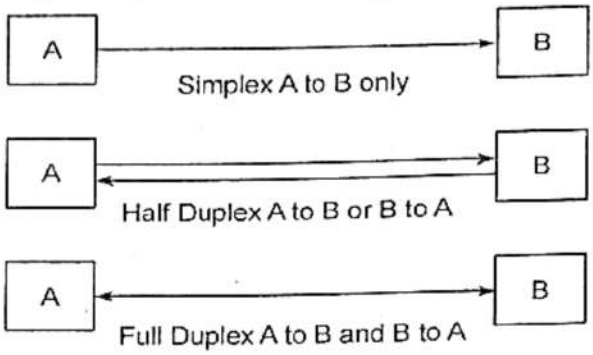
Q. 9. (b) Discuss Network topologies. **(6)**

Ans. Topology refers to the way in which the nodes of a network are linked together. It deTermines the data paths that may be used between any pair of nodes in the network.

Choice of network topology depends on following factors.

1. Desired performance
2. Desired reliability
3. Number of nodes
4. Expandability of the system
5. Cost

multiple channels on the same medium. A channel is a distinct communication path between two or more nodes, much as a lane0000 which is a distinct transportation path on a freeway. Channels may be separated either logically or physically.



Various Data Transmission Mode

Q. 1. (f) Explain ROM, PROM. EPROM and UVEPROM. **(5)**

Ans. ROM(Read Only Memory): The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM stores such instructions that are required to start a computer. This operation is referred to as **bootstrap**. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.

PROM (Programmable Read Only Memory): PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip, there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

EPROM: It stands for Erasable Programmable Read-Only Memory . It overcomes the disadvantage of PROM that once programmed, the fixed pattern is permanent and cannot be altered. If a bit pattern has been established, the PROM becomes unusable, if the.bit pattern has to be changed.

This problem has been overcome by the EPROM, as when the EPROM is placed under a special ultraviolet light for a length of time, the shortwave radiation makes the EPROM return to its initial state, which then can be programmed accordingly. Again for erasing the content, PROM programmer or PROM burner is used.

UVEPROM: It stands for 'UltraViolet Erasable Programmable Read-Only Memory'. Chips may be erased through the use of ultraviolet light and then can have new data written to them.

UNIT-I

Q. 2. (a) Discuss the evolution of computers with the technologies used from first to fifth generation. **(6.5)**

Ans. "Generation" in computer terminology means a step of changing technology. It provides the framework for the growth of computer industry. There are five generations of computer, with the first generation computers being those which became commercially available in the early 1950s.

First Generation of Computers (1942-1955)

The first generation of computer was marked by the use of vacuum tubes for the electronic components and the use of either electrostatic tubes (i.e. cathode ray tubes) or mercury delay lines for storage.

Key Hardware: The period of first generation was 1942-1955. The computers of first generation used vacuum tubes as the basic components for memory and circuitry

for CPU (Central Processing Unit). These tubes, like electric bulbs, produced a lot of heat and were prone to frequent fusing of the installations, therefore, were very expensive and could be afforded only by very large organizations. In this generation mainly batch processing operating system were used. Punched cards, paper tape, and magnetic tape were used as input and output devices.

Key Software: The key software technologies in this generation used are machine and assembly languages.

Some computers of this generation were:

- ENIAC
- EDVAC
- UNIVAC
- IBM-701
- IBM-650

Second Generation of Computers (1955-1964)

The second generation machines were initially marked by either magnetic drum or magnetic core storage and later by the use of transistor in place of vacuum tubes.

Key Hardware: In this generation transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes. In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices.

Key Software: In this generation assembly language and high-level programming languages like FORTRAN, COBOL were used. The computers used batch processing and multiprogramming operating system.

Some computers of this generation were:

- IBM 1620
- IBM 7094
- CDC 1604
- CDC 3600
- UNIVAC 1108

Third Generation of Computers (1964-1975): The arrival of the third generation in mid-1960s proved to be an important milestone in the evolution of computers. The advances over the previous generation were very significant and, although relatively expensive, allowed an increasing number of organizations to reap the undoubted benefits which computerization could bring. Because of the high costs involved and the need to get maximum utilization from the machine, the computer service bureau business was spawned. This, in itself, was important as it allowed companies to avail themselves the new technology and to take advantage of continuing developments. Many of the computers acquired by companies during this period are still in use.

Key Hardware: The computers of third generation used integrated circuits (IC's) in place of transistors. A single IC has many transistors, resistors and capacitors along with the associated circuitry. This development made computers smaller in size, reliable and efficient. Larger capacities disks and magnetic tapes are used as secondary storage devices.

Key Software: In this generation remote processing, time-sharing, multi-programming operating system were used. High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.

Some computers of this generation were:

- IBM-360 series

- Honeywell-6000 series
- PDP(Personal Data Processor)
- IBM-370/168

Fourth Generation of Computers (1975-1989): The fourth generation of computers arrived in mid-1970s. The distinguishing marks were the introduction of standard architecture for greater mobility of systems, the introduction of micro technology and significant software developments. The IBM-4300 and ICL- 2900 ranges coincided with the start of this era. Micro technology gave rise to the availability of microcomputers, word processors and intelligent terminals.

Key Hardware: The computers of fourth generation used Very Large Scale Integrated (VLSI) circuits. VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation. Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution. Some hardware technologies includes microprocessors, semiconductor memory, portable storage devices, super computers based on parallel vector processing and systematic multiprocessing technologies.

Key Software: In this generation time sharing, real time, networks, distributed operating system were used. All the high-level languages like C, C++, DBASE etc., were used in this generation. Key software technologies for this generation also includes Network based and supercomputing applications, Unix operating system with C language.

Some computers of this generation were:

- DEC 10
- STAR 1000
- PDP 11
- CRAY-1(Super Computer)

Fifth Generation of Computers (1989-present): It is very difficult to define the fifth generation of computers. The most famous example of this generation computer is fictional HAL9000 from Arutur C. Clarke's novel. HAL performed all the functions currently envisioned for real time fifth generation computer.

Key Hardware: In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components. This generation is based on parallel processing hardware. Some more key hardware includes larger capacity main memory disks, hard disks, optical disks, powerful servers, cluster computing.

Key Software: AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings. All the high-level languages like C and C++, Java, .Net etc., are used in this generation.

AI includes: Robotics, Neural Networks, Game Playing, Development of expert systems to make decisions in real life situations, Natural language understanding and generation.

Q. 2. (b) What are the various classification of computers. Explain with examples. **(6)**

Ans. Refer Q.2.(a) from End Term Examination December 2017.

OR

Q. 3. (a) Define memory. Explain different types of memory used in computers. **(6.5)**

END TERM EXAMINATION [JANUARY-2024]
FIRST SEMESTER [BCA]
FUNDAMENTALS OF COMPUTERS & IT [BCA-105]

Time: 3 Hrs. **Max. Marks: 60**

Note: Attempt five questions in all including Q. No. 1 which is compulsory. Select one question from each unit.

Q.1. Answer any five of the following:

Q.1. (a) Explain the block diagram of a computer and its components. Discuss their functioning in details. **(4)**

Ans. Refer to Q.1 (b) from End Term Examination Nov.-Dec. 2018. (Pg. No. 2–2018).

Q.1. (b) Differentiate between Impact and Non-Impact Printers. **(4)**

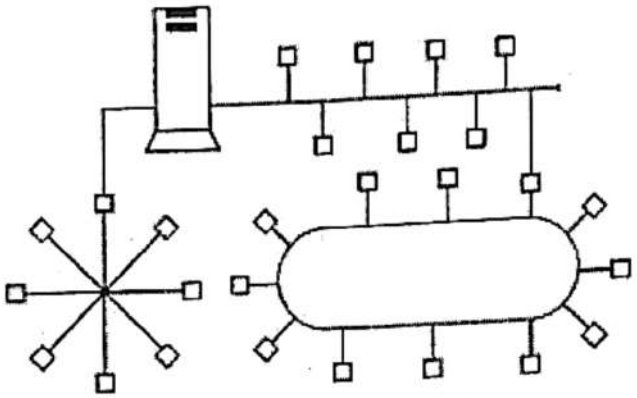
Ans.

Features	Impact Printer	Non-impact Printer
Definition	These printers create figures and images by striking an inked ribbon with a device that includes a wheel or a print hammer.	These printers produce figures and images with no connection between the paper and the printing device.
Printers Speed	These printers are lower than non-impact printers, consuming a huge time to print a page or document.	These printers are faster than non-impact printers, and these printers may print multiple pages per minute.
Technology	It utilizes old technology.	It utilizes the latest technology.
Noise Level	These printers produce high-level noise as they have various moving parts.	These printers have a low level of noise.
Cost	These printers are less costly.	These printers are costly.
Printing Mechanism	These printers print by striking a character dye or metal pin.	These printers print by dropping ink on any type of paper.
Printing Ink	When the print head impacts, they utilize special inked ribbons to make the print on paper.	It utilizes toner and cartridges to print the paper.
Graphic Images	Except for the dot matrix printer, it may not print graphics images.	It may print graphical images.
Print Quality	Its print quality is low.	Its print quality is high.

Q.1. (c) Distinguish between Loader and Linker. **(4)**

Ans. Refer to Q.5 (b) (iii) from End Term Exam. February 2023.(Pg. No. 12–2022).

Hybrid Topology: It is a combination of two or more different network topologies. The exact configuration depends upon the needs of an organization.



Advantage of Hybrid Network

1. Flexible : Hybrid Network can be designed according to the requirements of the organization and by optimizing the available resources.

2. Effective: Hybrid topology is the combination of two or more topologies, so we can design it in such a way that strengths of constituent topologies are maximized while there weaknesses are neutralized.

3. Scalable: Its easy to increase the size of network by adding new components, without disturbing existing architecture.

Disadvantage of Hybrid Network

1. Complexity of Design: One of the biggest drawback of hybrid topology is its design. Its not easy to design this type of architecture and its a tough job for designers.

2. Costly Infrastructure: As hybrid architectures are usually larger in scale, they require a lot of cables, cooling systems, sophisticate network devices, etc.

Q. 1. (d) What is an instruction set? Explain the various types of addressing modes. **(5)**

Ans. An instruction set, or command set, is the basic set of commands understood by the microprocessor. When compiled, the high-level instructions of the programming language are transformed into the machine-level commands for a specific microprocessor. Two important factors in instruction set design are decoder simplicity and code density. The decoder reads the next instruction from memory, and then routes the component pieces of that instruction appropriately. The design of the instruction set can dramatically affect the complexity and, therefore, the speed of decoding the instructions.

Types of addressing modes: The way of specifying data to be operated by an instruction is called addressing mode.

- **Immediate Addressing Mode –** In immediate addressing mode the source operand is always data. If the data is 8-bit, then the instruction will be of 2 bytes, if the data is of 16-bit then the instruction will be of 3 bytes.

Examples: MVI B 45 (move the data 45H immediately to register B) LXI H 3050 (load the H-L pair with the operand 3050H immediately) JMP address (jump to the operand address immediately).

- **Register Addressing Mode –** In register addressing mode, the data to be operated is available inside the register(s) and register(s) is(are) operands. Therefore the operation is performed within various registers of the microprocessor.

Examples: MOV A, B (move the contents of register B to register A) ADD B (add contents of registers A and B and store the result in register A) INR A (increment the contents of register A by one)

•**Direct Addressing Mode** – In direct addressing mode, the data to be operated is available inside a memory location and that memory location is directly specified as an operand. The operand is directly available in the instruction itself.

Examples: LDA 2050 (load the contents of memory location into accumulator A) LHLD address (load contents of 16-bit memory location into H-L register pair) IN 35 (read the data from port whose address is 01)

• **Register Indirect Addressing Mode** – IN register indirect addressing mode, the data to be operated is available inside a memory location and that memory location is indirectly specified b a register pair.

Examples: MOV A, M (move the contents of the memory location pointed by the H L pair to the accumulator).

LDAX B (move contains of B-C register to the accumulator)

LXIH 9570 (load immediate the H-L pair with the address of the location 9570)

• **Implied/Implicit Addressing Mode** – In implied/implicit addressing mode the operand is hidden and the data to be operated is available in the instruction itself.

Examples: CMA (finds and stores the 1's complement of the contains of accumulator.

A in A) RRC (rotate accumulator A right by one bit)

RLC (rotate accumulator A left by one bit)

Q. 1. (e) Discuss the various data transmission modes. (5)

Ans. Data transmission, whether analog or digital, may also be characterized by the direction in which the signals travel over the media. These are as follows:

1. Simplex: In cases where signals travel in only one direction, the transmission is considered simplex.

Example: A football coach calling out orders to his team through a megaphone is using simplex communication. In this example, the coach's voice is the signal and it travels in only one direction away from the megaphone's mouthpiece and toward the team. Simplex is sometimes called one-way or unidirectional communication.

2. Half-Duplex: In half-duplex, transmission signals may travel in both directions over a medium but in only one direction at a time. Half-duplex systems contain only one channel for communication. That channel should be shared for multiple nodes to exchange information. For example, an apartment's intercom system that requires you to press a "talk" button in order to allow your voice to be transmitted over the wire uses half-duplex transmission. If you visit a friend's apartment building, you press the "talk" button to send your voice signals to their apartment. When your friend responds, he presses the "talk" button in his apartment to send his voice signal in the opposite direction over the wire to the speaker in the lobby where you wait. If you press the "talk" button while he is talking, you will not be able to hear his voice transmission. In the similar manner, some networks operate with only half-duplex capability over their wires.

3. Full-Duplex: When signals are free to travel in both directions over a medium simultaneously, the transmission is considered full-duplex. Full-duplex may also be called bi-directional transmission or sometimes, simply duplex. When you call a friend on the telephone, your connection is an example of a full-duplex transmission because your voice signals can be transmitted to your friend at the same time your friend's voice signals are transmitted in the opposite direction to you. In other words, both of you can talk and hear each other simultaneously.

Full-duplex transmission is also used on data networks. For example, modern Ethernet networks use full duplex. In this situation, full-duplex transmission uses

Metropolitan Area Network (MAN): A metropolitan area network is a system of LANs connected throughout a city or metropolitan area. MANs require telecommunication media such as voice channels or data channels. Branch offices are connected to head offices through MANs. Universities, colleges, grocery chains and banks are some of the examples of organizations using MAN.

One can also define it as a network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large Local Area Network (LAN) but smaller than the area covered by a Wide Area Network (WAN). The term is applied to the interconnection of networks in a city into a single larger network (which may then also offer efficient connection to a wide area network). It is also used to mean the interconnection of several local area networks by bridging them with backbone lines. The latter usage is also sometimes referred to as a campus network. MAN takes over the rein in hand where LAN is not optimal feasible both technical and financially. The main criterion for a MAN is that the connection between LANs is through a local exchange carrier (a local phone company). The protocols that are used for MANs are quite different from those used for LANs (except for ATM under certain conditions).

WAN (Wide Area Network): A wide area network is a network system connecting cities, countries, or continents together. TransCanada pipeline has a WAN that stretches from Alberta to Ontario then through the United States and finally ends up in Boston. The maintenance and control of the network resides in Calgary. WANs are connected together using one of the telecommunications media. The main difference between a MAN and a WAN is that a WAN uses long distance carriers. Otherwise, the same protocols and equipment are used in a MAN.

They may link various computers by means of cables, optical fibers, or satellites but their users commonly access the networks via a modem (a device that allows computers to communicate over telephone lines). The largest wide area network is the Internet, a collection of networks and gateways linking millions of computer users on every continent.

Wide area network services can be classified in the following ways:

(a) There are services by public carriers and those provided through private user facilities like microwave or private optic cable networks.

(b) Service can be based on relatively permanent connections (switched or dial-up).

(c) Services can also be based on analog information flows or digital flows and on circuit or packet switched technology.

Today, WANs (Wide Area Networks) can be created using many types of services for the small business and home business users. The only constraint is you will be able to access only that service which would be provided by a local operating company.

Difference between Intranet and Extranet:

Intranet: An intranet is a platform which works on the same principals as the internet but is not accessible to the outer world. It is unique to an organization such as universities which have information provided and can be viewed within the premises of the Institute. All the computer are connected with each other and have no connection with the outer world. When the intranet is connected to the internet, it will be protected with another level of security in the form of the firewall so that only particular people can reach it. To simplify it is a network on the computer which works without depending on the internet. There are files of intranet present inside the computer which help in gaining all the information without depending on the internet.

Extranet: An Extranet is best explained as a network which depends on the internet but is restricted to specific users. It is more accurate than intranet in a way that only a few people instead of a particular place can get access. It is protected by a firewall and if the intranet is accessed from the internet to send or receive information it becomes an extranet. It is mostly used by business and companies who have to share sensitive data

with each other. The firewall is used to switch between internet and intranet and lets only the people who can log in with the help of passwords or by internet protocol addresses. It can be used by individuals or a group of folks depending on the level of requirement.

Intranet	Extranet
An intranet is unique to an organization or group of people who work together at a place	Extranet is for individuals or group of personnel who want to send private information
Privacy	
Private intermediately	Extremely Private
Dependency	
Independent yet dependent on internet	Dependent on internet and intranet
Firewall	
Can have	Yes

Q. 8. (b) Discuss client server architecture in detail. **(6)**

Ans. Refer Q.9.(a) from End Term Examination December 2017.

Q. 9. Write short notes on (any three) **(12.5)**

(a) World wide web

Ans. The World Wide Web (WWW) is combination of all resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP).

A broader definition comes from the World Wide Web Consortium (W3C):

"The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge."

The Web, as it's commonly known, is often confused with the internet. Although the two are intricately connected, they are different things. The internet is, as its name implies, a network —a vast, global network that incorporates a multitude of lesser networks. As such; the internet consists of supporting infrastructure and other technologies. In contrast, the Web is a communications model that, through HTTP, enables the exchange of information over the'internet.

Q.9. (b) FTP

Ans. FTP:- File Transfer Protocol (FTP) is a standard network protocol used to transfer files from one host or to another host over a TCP-based network, such as the Internet.

FTP is built on a client-server architecture and uses separate control and data connections between the client and the server. FTP users may authenticate themselves using a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it. For secure transmission that hides (encrypts) the username and password, and encrypts the content, FTP is often secured with SSL/TLS ("FTPS").

The first FTP client applications were command-line applications developed before operating systems had graphical user interfaces, and are still shipped with most Windows, Unix, and Linux operating systems. Dozens of FTP clients and automation utilities have since been developed for desktops, servers, mobile devices, and hardware, and FTP has been incorporated into hundreds of productivity applications, such as web page editors.

FTP (File Transfer Protocol) is a way to upload and download files on the Internet. Downloading and uploading are the two basic processes used on the Internet. Downloading is a process of transferring data from the Internet to a local computer whereas uploading is a reverse process, i.e. transferring data from a local computer to

Q.1. (d) Explain transmission modes. (4)

Ans. Data transmission, whether analog or digital, may also be characterized by the direction in which the signals travel over the media. These are as follows:

Refer Q.1 (e) End Term Examination Nov-Dec. – 2018 (Pg. No. 7–2018).

Q.1. (e) Describe ASCII and EBCDIC Codes. (4)

Ans. ASCII:

• **Bit Size**: 7-bit (commonly extended to 8-bit)

• **Number of Characters**: 128 standard characters (with 7 bits), and 256 characters in extended 8-bit ASCII.

• **Character Range**:

(a) ASCII includes English letters (both uppercase and lowercase), digits (0–9), punctuation marks, and control characters.

(b) Standard ASCII ranges from 0 to 127. Extended ASCII, using 8 bits, includes additional characters such as accented letters and symbols.

• **Usage**: Widely used in modern computing systems, programming, and data encoding across various platforms. ASCII is the default character set for text files, web pages, and more.

• **Example**:

(a) Character 'A' is represented as 65 in decimal or 1000001 in binary.

(b) Character 'a' is 97, and '0' is 48.

EBCDIC:

• **Bit Size**: 8-bit

• **Number of Characters**: 256 characters

• **Character Range:** EBCDIC includes a similar set of characters as ASCII (letters, digits, punctuation, and control characters), but it uses a different binary encoding for the characters.

• **Usage**: Primarily used on IBM mainframe and midrange computer systems. EBCDIC is less common in modern systems compared to ASCII, but it's still used in legacy applications.

• **Example**:

(a) Character 'A' in EBCDIC is represented as 193 in decimal or 11000001 in binary.

(b) Character 'a' is 129, and '0' is 240.

Q.1. (f) Briefly describe different types of network. (4)

Ans. Computer networks are classified based on their size, range, and purpose. Here are the main types:

1. PAN (Personal Area Network):

• Range: Within a few meters.

• Usage: Connects personal devices like smartphones, laptops, and tablets.

• Example: Bluetooth connections, connecting a phone to a wireless headset.

2. LAN (Local Area Network):

• Range: Limited to a single building or small geographical area.

• Usage: Connects devices within an organization or home.

• Example: Office network, home Wi-Fi network.

3. MAN (Metropolitan Area Network):

• Range: Spans across a city or large campus.

• Usage: Connects multiple LANs within a city or region.

• Example: City-wide Wi-Fi networks, university campus networks.

4. WAN (Wide Area Network):

- Range: Spans large geographical areas, such as countries or continents.
- Usage: Connects multiple LANs and MANs across distant locations.
- Example: The Internet, large enterprise networks.

5. SAN (Storage Area Network):

- Range: A dedicated network for data storage.
- Usage: Provides access to consolidated, block-level storage.
- Example: Networks connecting large databases or storage systems in data centers.

6. VPN (Virtual Private Network):

- Range: Extends private networks across public networks (e.g., the Internet).
- Usage: Provides secure connections for remote users.
- Example: Remote access to a company's internal network.

Each type serves a specific function depending on the scale, purpose, and distance.

UNIT-I

Q.2. (a) Define Computers and its features. (5)

Ans. A **computer** is an electronic device that processes data and performs tasks according to a set of instructions (software). It can perform a wide variety of operations, ranging from simple calculations to complex problem-solving, making it an essential tool in modern society.

Features of Computers:

1. Speed: • Computers can process data at extremely high speeds, performing millions to billions of calculations per second.

2. Accuracy: • Computers are highly accurate, with very few errors unless caused by hardware failure or incorrect programming.

3. Automation: • Once programmed, computers can perform tasks automatically without human intervention.

4. Storage: • Computers can store vast amounts of data in different forms (text, images, videos), which can be retrieved at any time.

5. Versatility: • Computers are capable of performing a wide range of tasks, from word processing to gaming, graphic design, and complex scientific simulations.

6. Diligence: • Computers can work continuously without fatigue or a decrease in performance, unlike humans.

7. Connectivity: • Modern computers can connect to other devices and networks, enabling communication, data sharing, and collaborative work globally.

8. Programmability: • Computers can be programmed to carry out specific instructions, allowing them to perform a wide variety of tasks based on the software they run.

Computers are used in diverse fields like education, healthcare, business, research, and entertainment due to these key features.

Q.2. (b) Explain classification of Computers with example. (4)

Ans. Refer to Q. 2 (a) from End Term Examination Nov.-Dec. 2017. (Pg. No. 3–2017).

OR

Q.3. (a) Define memory. Distinguish between Primary and Secondary Memory. (5)

Ans. A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored. The memory is divided into large

loops and repeat until loops. That's handy as it enables you not to have to copy the same lines of code many times.

Q.7. (c) Procedure-oriented and Object-oriented languages **(2.5)**

Ans.

DividedInto	In POP, program is divided into small parts called functions.	In OOP, program is divided into parts called objects.
Importance	In POP,Importance is not given to data but to functions as well as sequence of actions to be done.	In OOP, Importance is given to the data rather than procedures or functions because it works as a real world.
Approach	POP follows Top Down approach.	OOP follows Bottom Up approach.
Access Specifiers	POP does not have any access specifier.	OOP has access specifiers named Public, Private, Protected, etc.
Data Moving	In POP, Data can move freely from function to function in the system.	In OOP, objects can move and communicate with each other through member functions.
Expansion	To add new data and function in POP is not so easy.	OOP provides an easy way to add new data and function.
Data Access	In POP, Most function uses Globaldata for sharing that can be accessed freely from function to function in the system.	In OOP, data can not move easily from function to function,it can be kept public or private so we can control the access of data.
Data Hiding	POP does not have any proper way for hiding data so it is less secure.	OOP provides Data Hiding so provides more security.
Overloading	In POP, Overloading is not possible.	In OOP, overloading is possible in the form of Function Overloading and Operator Overloading.
Examples	Example of POP are : C, VB, FORTRAN, Pascal.	Example of OOP are : C++, JAVA, VB.NET, C#.NET.

Q.7. (*d*) Low-level and High-level language **(2.5)**

Ans. High-level Language

1. Learning: High-level languages are easy to learn.

2 Understanding: High level languages are near to human languages.

3. Execution: Programs in high-level languages are slow in execution.

4. Modification : Programs in high-level languages are easy to modify.

5. Facility at hardware level : High-level languages do not provide much facility at hardware level.

6. Knowledge of hardware Deep : Knowledge of hardware is not required to write programs.

7. Uses : These languages are normally used to write application programs.

Low-level languages

1. Learning :Low-level languages are difficult to learn.

2 Understanding :Low-level languages are far from human languages.

3. Execution :Programs in low-level languages are fast in execution.

4. Modification :Programs in low-level languages are difficult to modify.

5. Facility at hardware level :Low-level languages provide facility to write programs at hardware level.

6. Knowledge of hardware Deep : Deep knowledge of hardware is required to write programs.

7. Uses :These languages are normally used to write hardware programs.

Q.7. (e) Multiprocessing and multitasking **(2.5)**

Ans. Multiprocessing

Multiprocessing sometimes refers to executing multiple processes (programs) at the same time. Multiprocessing refers actually to the CPU units rather than running processes. If the underlying hardware provides more than one processor then that is multiprocessing. There are many variations on the basic scheme for example having multiple cores on one die or multiple dies in one package or multiple packages in one system. In summary, multiprocessing refers to the underlying hardware (multiple CPUs, Cores) while multiprogramming refers to the software (multiple programs, processes). Note that a system can be both multi-programmed by having multiple programs running at the same time and multiprocessing by having more than one physical processor.

Multitasking

Multitasking has the same meaning as multiprogramming in the general sense as both refer to having multiple (programs, processes, tasks, threads) running at the same time. Multitasking is the term used in modern operating systems when multiple tasks share a common processing resource (CPU and Memory). At any point in time the CPU is executing one task only while other tasks waiting their turn. The illusion of parallelism is achieved when the CPU is reassigned to another task (context switch). There are few main differences between multitasking and multiprogramming (based on the definition provided in this article). A task in a multitasking operating system is not a whole application program (recall that programs in modern operating systems are divided into logical pages). Task can also refer to a thread of execution when one process is divided into sub tasks. The task does not hijack the CPU until it finishes like in the older multiprogramming model but rather have a fair share amount of the CPU time called quantum (will talk about time sharing later in this article). Just to make it easy to remember, multitasking and multiprogramming refer to a similar concept (sharing CPU time) where one is used in modern operating systems while the other is used in older operating systems.

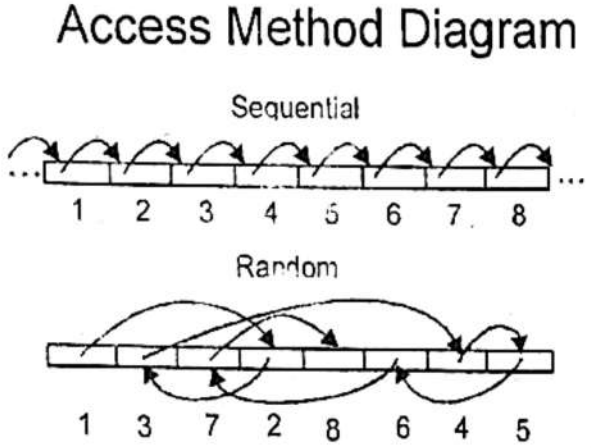
UNIT IV

Q.8. Write short notes on the following: **(2.5)**

(a) Component of computer

Ans. Hardware components are often categorized as being either input, output, storage or processing components. Devices which are not an integral part of the CPU are referred to as being peripherals. Peripherals are usually used for either input, storage or output (such as a hard disk, keyboard or printer). A device does not necessarily have

A common example of sequential access is with a tape drive, where the device must move the tape's ribbon forward or backward to reach the desired information. The opposite would be RAM (Random Access Memory) that can go anywhere on the chip to access the information.



Q. 3. (b) Differential between Magnetic Tape and Magnetic Hard Disk

Ans. Magnetic tape and magnetic disk both stores the data magnetically. The surface of a magnetic tape and the surface of a magnetic disk are covered with a magnetic material which helps in storing the information magnetically. Both are **non-volatile storage**. Despite these similarities both differs in many aspects from their appearance to their working, their cost and much more.

BASIS	MAGNETIC TAPE	MAGNETIC DISK
Basic	Used for backup, and storage of less frequently used information.	Used as a secondary storage.
Physical	Plastic thin, long, narrow strip coated with magnetic material.	Several platters arranged above each other to form a cylinder, each platter has a read-write head.
Use	Idle for sequential access.	Idle for random access.
Access	Slower in data accessing.	Fast in data accessing.
Update	Once data is fed, it can't be updated.	Data can be updated.
Data loss	If the tape is damaged, the data is lost.	In a case of a head crash, the data is lost.
Storage	Typically stores from 20 GB to 200 GB.	From Several hundred GB to Terabytes.
Expense	Magnetic tapes are less expensive.	Magnetic disk is more expensive.

UNIT-II

Q. 4. (a) Differentiate between Assembler, Compiler and Interpreter. (6.5)

Ans. Compiler:

⇒ Compiler is a translator which translates high level Languages like C, C++ to Machine code.

⇒ Comp er Scans the entire program at once and then converts into Machine code.

⇒ Execution of programs are faster in Compilers.

⇒ Compilers translates error report after translation of entire code.

2. Attack

A breach of security that allows unauthorized access to a resource.

Command interpreter allows the user to interact with a program using commands in the form of text lines. It was frequently used until the 1970's. However, in modern times many command interpreters are replaced by graphical user interfaces and menu-driven interfaces. Command interpreters serve many purposes and are more useful than graphical user interfaces in some cases.

OR

Q.5. (a) Define the following Terms:- (8)

(i) Multiprogramming

(ii) Multitasking

(iii) Multi-threading

(iv) Multiprocessing

Ans. (i) A multiprogramming operating system may run many programs on a single processor computer. If one program must wait for an input/output transfer in a multiprogramming operating system, the other programs are ready to use the CPU. As a result, various jobs may share CPU time. However, the execution of their jobs is not defined to be at the same time period.

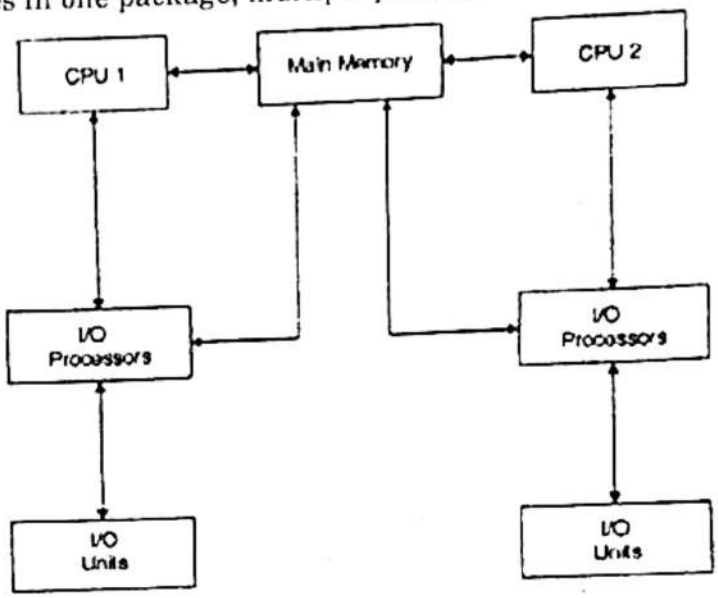
When a program is being performed, it is known as a **"Task", "Process", and "Job"**. Concurrent program executions improve system resource consumption and throughput as compared to serial and batch processing systems.

The primary goal of multiprogramming is to manage the entire system's resources. The key components of a multiprogramming system are the file system, command processor, transient area, and I/O control system. As a result, multiprogramming operating systems are designed to store different programs based on sub-segmenting parts of the transient area. The resource management routines are linked with the operating system core functions.

Ans. (ii) Multitasking has the same meaning as multiprogramming in the general sense as both refer to having multiple (programs, processes, tasks, threads) running at the same time. Multitasking is the term used in modern operating systems when multiple tasks share a common processing resource (CPU and Memory). At any point in time the CPU is executing one task only while other tasks waiting their turn. The illusion of parallelism is achieved when the CPU is reassigned to another task (context switch). There are few main differences between multitasking and multiprogramming (based on the definition provided in this article). A task in a multitasking operating system is not a whole application program (recall that programs in modern operating systems are divided into logical pages). Task can also refer to a thread of execution when one process is divided into sub tasks. The task does not hijack the CPU until it finishes like in the older multiprogramming model but rather have a fair share amount of the CPU time called quantum (will talk about time sharing later in this article). Just to make it easy to remember, multitasking and multiprogramming refer to a similar concept (sharing CPU time) where one is used in modern operating systems while the other is used in older operating systems.

Ans. (iii) Multithreading allows the application to divide its task into individual threads. In multi-threads, the same process or task can be done by the number of threads, or we can say that there is more than one thread to perform the task in multithreading. With the use of multithreading, multitasking can be achieved.

Ans. (iv) Multiprocessing is the use of two or more central processing units (CPUs) within a single computer system. The term also refers to the ability of a system to support more than one processor and the ability to allocate tasks between them. There are many variations on this basic theme, and the definition of multiprocessing can vary with context, mostly as a function of how CPUs are defined (multiple cores on one die, multiple dies in one package, multiple packages in one system unit, etc.).



There is two types of multiprocessing systems.

(i) Tightly-coupled System: In which all processor share the same main memory.

(ii) Loosely-coupled System: In which all processor haveit's own local memory.

Multiprocessing system is based on the symmetric multiprocessing model, in which each processor runs an identical copy of operating system and these copies communicate with each other. In this system processor is assigned a specific task. A master processor controls the system. This scheme defines a master-slave relationship. These systems can save money in compare to single processor systems because the processors can share peripherals, power supplies and other devices. The main advantage of multiprocessor system is to get more work done in a shorter period of time. Moreover, multiprocessor systems prove more reliable in the situations of failure of one processor. In this situation, the system with multiprocessor will not halt the system; it will only slow it down.

Q.5. (b) Give Difference between:- **(4.5)**

(i) Assembler and Loader (ii) Interpreter and compiler (iii) Linker and Loader.

Ans. Assembler: Assembler is a computer program which is used to translate program written in Assembly Language in to machine language. The translated program is called as object program. Assembler checks each instruction for its correctness and generates diagnostic messages, if there are mistakes in the program. Various steps of assembling are:

system" of a computer as it manages and coordinates all the units of computer. It obtains the instructions from the memory, interprets them and directs the operation of computer. It also performs the physical data transfer between memory and peripheral devices.

Memory Unit: The memory unit is the unit where all the input data and results stored. The CPU memory is also called as memory register. The memory of a computer is also available in the form of Random Access Memory (RAM). RAM is a semiconductor chip. RAM is considered as a volatile memory, it means as long power is supporting information stored in it remain. Once the power is lost, the information stored in the RAM also get erased. Microcomputers contains read Only Memory (ROM). ROM contains instructions for the microcomputers. Microcomputers use ROM, programmable read only memory (PROM), and erasable programmable read-only memory (EPROM) to store selected application programs. The contents of ROM are determined when the chips are manufactured. The ROM memory is considered as non volatile, means the information is not get erased even when power is failed. The most important ROM chip(s) we should know about is the Basic Input/output system or BIOS. The BIOS is a collection of small computer programs built into a ROM chip.

On personal computer there are three types of memory. They are

(1) Conventional memory: The memory into which we load our software and work files. Conventional memory also known as base or low memory is any memory below 1M (1024) although only 640k of it is directly available for our work.

(2) Extended memory (XMS): Memory above 1M. This type of memory is usually not directly available to our software.

(3) Expanded memory (EMS): To expand the memory by reserving a special peephole of 64kb of memory to be used when the computer requests certain data not immediately available from RAM. Usually a software utility called an Expanded Memory Manager (EMM) manages this expanded memory.

Output Unit: The output device is used to display or print result from a computer. Monitor, printer and plotter are commonly used output devices. A monitor is used to display the result in the form of text and graphics. The printer is used to print the result. A plotter is used to plot or print graphical result from a computer. Note that a result displayed in a monitor is temporary and it disappears when the next result is displayed, whereas the output printed using a printer or a plotter is permanent and these printouts can be used for any business correspondence or documentation. Normally soft copy is referred to information that is stored on the storage device. A hard copy refers to a print out showing the information.

Storage Unit: Storage unit provides space for storing data, instructions, intermediate results and final results.

Functions of Storage Unit

(1) Store data, programs and software.

(2) Store intermediate results.

(3) Store final results.

Example of Storage Unit: Hard-Disk, RAM, DVD, CD and ROM etc.

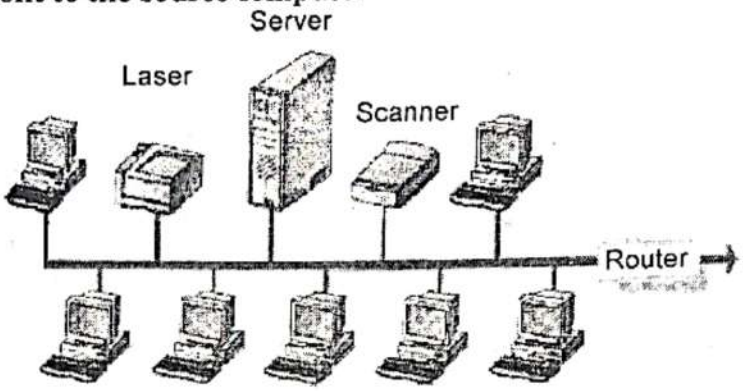
Q. 1. (c) Describe the various network topologies with examples. (5)

Ans. Topology refers to the way in which the nodes of a network are linked together. It determines the data paths that may be used between any pair of nodes in the network.

Choice of network topology depends on following factors.

1. Desired performance
2. Desired reliability
3. Number of nodes
4. Expandability of the system
5. Cost
6. Delay in data transmission

Bus Topology : A single transmission medium is shared by all nodes. Each computer appends the destination address to the data packed and drops the packet in the line. Each computer listens to the line and picks the data packet addressed to him and sends the acknowledgment to the source computer



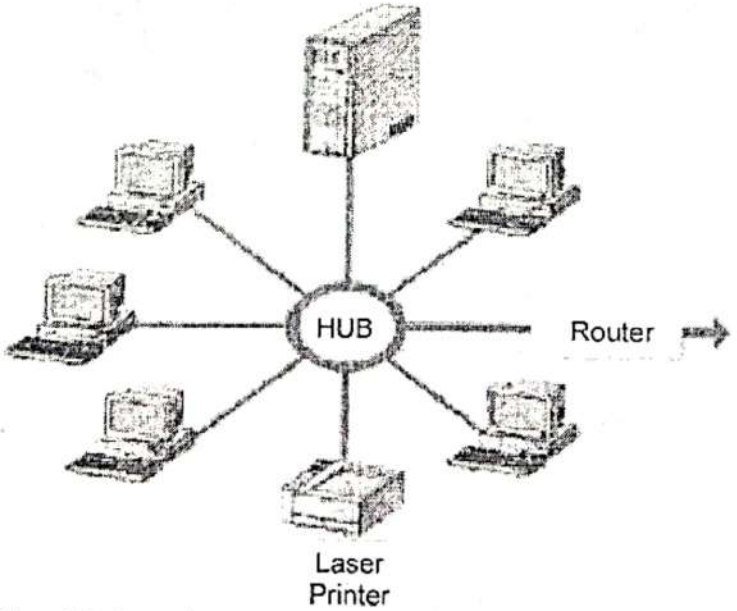
Advantage of Bus Network

1. Reduction in physical lines.
2. Failure of one computer does not affect the network.
3. Addition of new computer is easy.

Disadvantage of Bus Network

1. All computers must have good communication and decision making capability.
2. If link fails , the network fails.

Star Topology: Multiple computers are connected to a host computer. The routing function is performed by host computer, which controls the communication between two computers.



Advantage of Star Network

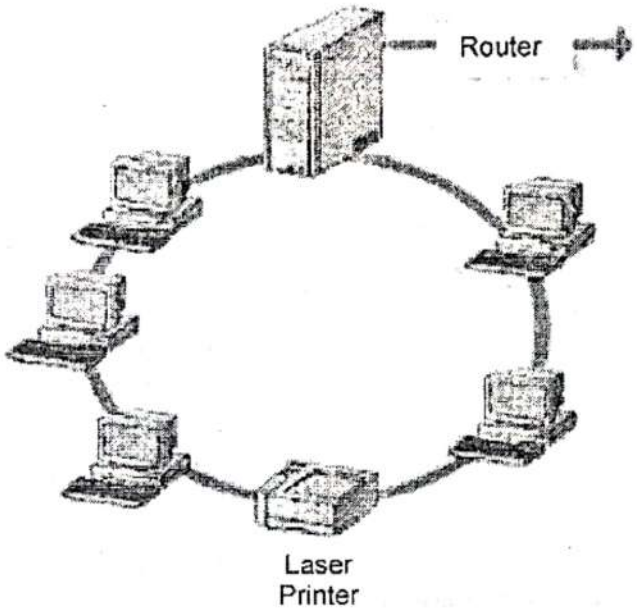
1. Minimal line cost. Only n-1 lines are required for connecting n nodes.
2. Transmission delays between nodes do not increase by adding new nodes.
3. If local computer fails, the network remains unaffected.

Disadvantage of Star Network

1. System depends on central host computer. If it fails the entire network fails.

Ring Topology: In this each computer is connected to two of its neighbour forming a circular arrangement of computers. There is no central computer. A node can receive

data from one of its two adjacent nodes. If the data is for it's own use, it will consume it or passes it on to the next node.



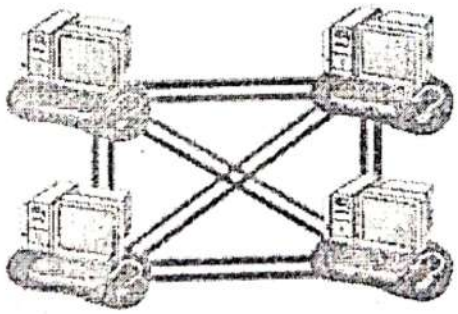
Advantage of Ring Network

1. No data collision.
2. More reliable than star network.
3. Works well even when no central computer is present.

Disadvantage of Ring Network

1. Delay is directly proportional to the number of nodes.
2. Each computer requires software to pass the data to next node.
3. Slow as compare to Star network.

Mesh Topology: In this topology each computer is connected to every other computer in the network. Dedicated link between every computer.



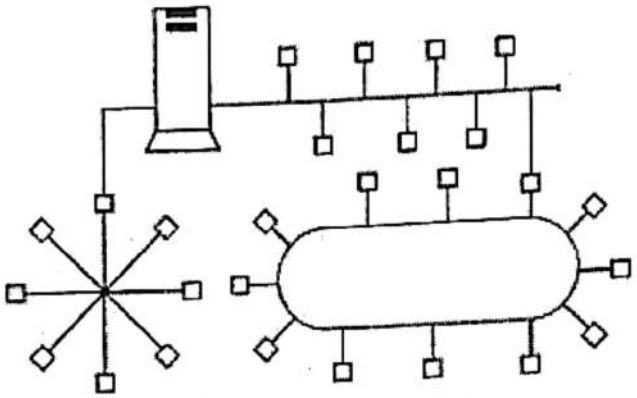
Advantage of Mesh Network

1. Communication is very fast.
2. No need of routing capability.
3. Very reliable.

Disadvantage of Mesh Network

1. Very high cost because of large number of links. N(N-1)/2 links are required to connect N computers.
2. Difficult to setup because of large number of links.
3. Only suitable for few computers.

Hybrid Topology: It is a combination of two or more different network topologies. The exact configuration depends upon the needs of an organization.



Advantage of Hybrid Network

1. Flexible : Hybrid Network can be designed according to the requirements of the organization and by optimizing the available resources.

2. Effective: Hybrid topology is the combination of two or more topologies, so we can design it in such a way that strengths of constituent topologies are maximized while there weaknesses are neutralized.

3. Scalable: Its easy to increase the size of network by adding new components, without disturbing existing architecture.

Disadvantage of Hybrid Network

1. Complexity of Design: One of the biggest drawback of hybrid topology is its design. Its not easy to design this type of architecture and its a tough job for designers.

2. Costly Infrastructure: As hybrid architectures are usually larger in scale, they require a lot of cables, cooling systems, sophisticate network devices, etc.

Q. 1. (d) What is an instruction set? Explain the various types of addressing modes. **(5)**

Ans. An instruction set, or command set, is the basic set of commands understood by the microprocessor. When compiled, the high-level instructions of the programming language are transformed into the machine-level commands for a specific microprocessor. Two important factors in instruction set design are decoder simplicity and code density. The decoder reads the next instruction from memory, and then routes the component pieces of that instruction appropriately. The design of the instruction set can dramatically affect the complexity and, therefore, the speed of decoding the instructions.

Types of addressing modes: The way of specifying data to be operated by an instruction is called addressing mode.

- **Immediate Addressing Mode –** In immediate addressing mode the source operand is always data. If the data is 8-bit, then the instruction will be of 2 bytes, if the data is of 16-bit then the instruction will be of 3 bytes.

Examples: MVI B 45 (move the data 45H immediately to register B) LXI H 3050 (load the H-L pair with the operand 3050H immediately) JMP address (jump to the operand address immediately).

- **Register Addressing Mode –** In register addressing mode, the data to be operated is available inside the register(s) and register(s) is(are) operands. Therefore the operation is performed within various registers of the microprocessor.

Examples: MOV A, B (move the contents of register B to register A) ADD B (add contents of registers A and B and store the result in register A) INR A (increment the contents of register A by one)

Q.9. (*d*) OCR and OMR **(6.5)**

Ans. OMR (Optical Mark Recognition) and OCR (Optical Character Recognition) are two methods of getting information from paper into a digital format. Although both seem to work in similar ways, there is a major difference between OMR and OCR. The responsibility of OMR is only to tell whether a mark is present or not in a predetermined area. OCR also detects the presence of marks but its task doesn't stop there. OCR also needs to determine what that mark is. It is usually limited to a single language to limit the possible characters and enhance the accuracy.

The primary purpose of OCR is to eliminate the need to re-encode a document that has already been printed. OCR takes an image of a printed document, attempts to recognize all the characters on a page, then string the characters together into an editable document that can then be edited in a word processor and mostly resembles the original document. Although not 100% accurate, it significantly reduces the effort needed to recreate the document. In comparison, the main use of OMR is in tabulating or evaluating data from a large number of documents. The biggest example of this is in grading simple multiple choice exams. OMR is also used to tabulate data from census or surveys using the same method. OMR is much faster compared to doing it by hand since the machine can process a sheet in an instant.

When it comes to hardware, OMR is far simpler compared to OCR. In OMR, a light is shone into the predetermined spaces. If a mark is present, the paper would have less reflected light than if there was none. With OCR, it is not that simple. The image of the page is usually scanned into an image. The individual marks on the page are then evaluated separately and compared to the known character shapes. This is not very easy to achieve and is quite costly to be implemented in hardware. That is why most OCR systems use computers with the appropriate software. OMR systems are relatively easy to implement in hardware, and they are quite prevalent; like those machines used in lotteries.

Q.9. (*e*) Impact printer and impact less printer **(6.25)**

Ans. Impact Printers

Impact printers operate by having an element strike the paper. In a dot-matrix impact printer, which is the most common type still sold as of October of 2012, the printer's print head has a vertical column of pins which fire in order to generate characters. For instance, to make a capital "I" in a serif font, the top and bottom pin would fire, then every pin would fire, then the top and bottom pin would fire. The pins strike an ink-impregnated ribbon and press it into the paper, leaving a mark. One of the problems with dot matrix printing technology is that there are gaps between the pins, leading to output that has a number of gaps and looks incomplete. Daisy wheel impact printers pressed a wheel with pre-formed characters, much like the mechanism in an electrical typewriter, against a ribbon to form an impression on a page. They produced very high quality output but could only print in a single font and character size. In addition, they were extremely slow, with some printing just 10 characters per second.

Non-Impact Printers

The printheads of non-impact printers do not strike the page. In an inkjet printer, a printhead sits a small distance above the page and either sprays ink or pops a bubble of ink onto the paper. Laser and light-emitting diode printers use electrical charges to transfer dry toner particles from a light sensitive drum to a piece of paper and then melt the toner onto it.

constant current to maintain the voltage differentials. SRAM generally requires less power than DRAM, although its power requirements vary depending on clock speed. At higher clock speeds, it can use as much power as DRAM; however, at more moderate speeds, it requires only a fraction of what DRAM uses. When idle, SRAM power requirements are low. Each bit in a SRAM chip requires a cell of six transistors, although DRAM needs only one transistor and one capacitor. This means that SRAM cannot achieve the storage densities of the DRAM family. As with DRAM, SRAM chips are mostly large arrays of these cells of transistors.

The two primary applications of SRAM are embedded use and in computers. Embedded use refers to SRAM use in automotive and consumer electronics, industrial equipment, and almost all appliances or toys with an electronic user interface. Devices, such as cell phones and music synthesizers, can incorporate several megabytes of SRAM.

SRAM in computer systems is usually delegated to roles where a small amount of high speed memory is required, such as processor caches and I/O buffers. Printers and liquid crystal displays (LCDs) often use SRAM to buffer images. SRAM is also widely used in networking devices, such as routers, switches, and cable modems, to buffer transmitted information.

(ii) EPROM and FEPROM: EPROM stands for Erasable Programmable Read Only Memory. EPROM is a modern version PROM (or Programmable Read Only Memory). EPROM provides the facility of erasing data stored on it. It uses ultraviolet rays (UV rays) to erase the content stored it.

EPROM is built up of MOS (Metal Oxide Semiconductor) transistors. EPROM is a type of ROM on which data is written or deleted optically. For erasing the content in EPROM, a rock crystal window is provided at top of its packaging.

EEPROM stands for Electrically Erasable Programmable Read Only Memory. It is a type of ROM that uses electrical signals for erasing the data stored in the EEPROM. Basically, EEPROM is an extended variant of EPROM.

The whole circuitry of the EEPROM is encased in an opaque plastic case. The chief advantage of EEPROM is that it does not need to be separated from the circuit for erasing its content. Although, EEPROM is very expensive relative to PROM.

UNIT-II

Q.4. Define Operating System? Explain the role of an operating system with respect to following Function:- **(12.5)**

(a) Process Management

(b) Memory management

(c) Device management

(d) security

(e) Command interpretation

Ans. An operating system (sometimes abbreviated as "OS") is the program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The other programs are called applications or application programs. The application programs make use of the operating system by making

requests for services through a defined application program interface (API). In addition, users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI).

Process management: It deals with running multiple processes. Most operating system allow a process to be assigned a priority which affects its allocation of CPU time. Interactive operating systems also employ some level of feedback in which the task with which the user is working receives higher priority. In many systems there is a background process which runs when no other process is waiting for the CPU.

Memory management: The memory manager in an OS coordinates the memories by tracking which one is available, which is to be allocated or deallocated and how to swap between the main memory and secondary memories. The operating system tracks all memory used by each process so that when a process terminates, all memory used by that process will be available for other processes.

Device management in an operating system means controlling the Input/Output devices like disk, microphone, keyboard, printer, magnetic tape, USB ports, camcorder, scanner, other accessories, and supporting units like supporting units control channels. A process may require various resources, including main memory, file access, and access to disk drives, and others. If resources are available, they could be allocated, and control returned to the CPU. Otherwise, the procedure would have to be postponed until adequate resources become available. The system has multiple devices, and in order to handle these physical or virtual devices, the operating system requires a separate program known as an ad device controller. It also determines whether the requested device is available. The operating system (OS) handles communication with the devices via their drivers. The OS component gives a uniform interface for accessing devices with various physical features. There are various functions of device management in the operating system. Some of them are as follows:

1. It keeps track of data, status, location, uses, etc. The file system is a term used to define a group of facilities.

2. It enforces the pre-determined policies and decides which process receives the device when and for how long.

3. It improves the performance of specific devices.

4. It monitors the status of every device, including printers, storage drivers, and other devices.

5. It allocates and effectively deallocates the device. De-allocating differentiates the devices at two levels: first, when an I/O command is issued and temporarily freed. Second, when the job is completed, and the device is permanently release.

Security refers to providing safety for computer system resources like software, CPU, memory, disks, etc. It can protect against all threats, including viruses and unauthorized access. It can be enforced by assuring the operating system's integrity, confidentiality, and availability. If an illegal user runs a computer application, the computer or data stored may be seriously damaged. System security may be threatened through two violations, and these are as follows:

1. Threat

A program that has the potential to harm the system seriously.

2. Attack

A breach of security that allows unauthorized access to a resource.

Command interpreter allows the user to interact with a program using commands in the form of text lines. It was frequently used until the 1970's. However, in modern times many command interpreters are replaced by graphical user interfaces and menu-driven interfaces. Command interpreters serve many purposes and are more useful than graphical user interfaces in some cases.

OR

Q.5. (a) Define the following Terms:- (8)

(i) Multiprogramming

(ii) Multitasking

(iii) Multi-threading

(iv) Multiprocessing

Ans. (i) A multiprogramming operating system may run many programs on a single processor computer. If one program must wait for an input/output transfer in a multiprogramming operating system, the other programs are ready to use the CPU. As a result, various jobs may share CPU time. However, the execution of their jobs is not defined to be at the same time period.

When a program is being performed, it is known as a **"Task", "Process", and "Job"**. Concurrent program executions improve system resource consumption and throughput as compared to serial and batch processing systems.

The primary goal of multiprogramming is to manage the entire system's resources. The key components of a multiprogramming system are the file system, command processor, transient area, and I/O control system. As a result, multiprogramming operating systems are designed to store different programs based on sub-segmenting parts of the transient area. The resource management routines are linked with the operating system core functions.

Ans. (ii) Multitasking has the same meaning as multiprogramming in the general sense as both refer to having multiple (programs, processes, tasks, threads) running at the same time. Multitasking is the term used in modern operating systems when multiple tasks share a common processing resource (CPU and Memory). At any point in time the CPU is executing one task only while other tasks waiting their turn. The illusion of parallelism is achieved when the CPU is reassigned to another task (context switch). There are few main differences between multitasking and multiprogramming (based on the definition provided in this article). A task in a multitasking operating system is not a whole application program (recall that programs in modern operating systems are divided into logical pages). Task can also refer to a thread of execution when one process is divided into sub tasks. The task does not hijack the CPU until it finishes like in the older multiprogramming model but rather have a fair share amount of the CPU time called quantum (will talk about time sharing later in this article). Just to make it easy to remember, multitasking and multiprogramming refer to a similar concept (sharing CPU time) where one is used in modern operating systems while the other is used in older operating systems.

$(12)_{10} = (1100)_2$ ...(1)

Similarly, $(15)_{10} = (\ )_2$

2	15	
2	7	1
2	3	1
	1	1

$(15)_{10} = (1111)_2$ ...(2)

Using (1) and (2), to add (12) and (15)

```
  1100
+ 1111
------
 11011
```

Q.5. Differentiate between the following:

(a) 1's complement and 2's complement of binary system. (3)

Ans. 1's complement of a binary number is another binary number obtained by toggling all bits in it, *i.e.*, transforming the 0 bit to 1 and the 1 bit to 0.

Examples:

Let numbers be stored using 4 bits

1's complement of 7 (0111) is 8 (1000)

1's complement of 12 (1100) is 3 (0011)

2's complement of a binary number is 1 added to the 1's complement of the binary number.

Examples:

Let numbers be stored using 4 bits

2's complement of 7 (0111) is 9 (1001)

2's complement of 12 (1100) is 4 (0100)

These representations are used for signed numbers.

The main difference between 1's complement and 2's complement is that 1's complement has two representations of 0 (zero) – 00000000, which is positive zero (+0) and 11111111, which is negative zero (–0); whereas in 2's complement, there is only one representation for zero – 00000000 (+0) because if we add 1 to 11111111 (-1), we get 00000000 (+0) which is the same as positive zero. This is the reason why 2's complement is generally used.

Another difference is that while adding numbers using 1's s complement, we first do binary addition, then add in an end-around carry value. But, 2's complement has only one value for zero, and doesn't require carry values.

Q.5. (*b*) Positional and non-positional number system (3)

Ans. Positional Number System:

In positional number system, there are only a few symbols called digits, and these symbols represent different values depending on the position they occupy in the number. The value of each digit in such a number is determined by three considerations__

1. The digit.

2. The position of the digit in the number.

3. The base of the number system.

In positional number system, each symbol represents different value depending on the position they occupy in a number. In positional number system, each system has a value that relates to the number directly next to it. The total value of a positional number is the total of the resultant value of all positions.

Example: 12 can be 1 x 10 + 2 x 1, 10 + 2 = 12.

Non-Positional number system:

1. In non-positional number system, each symbol represents the same value regardless of its position.

2. In non-positional number system, each symbol represents a number with its own place value.

3. Example: Roman number system where I for 1, II for 2 etc.

In the non-positional number systems, the characters used are I for 1, II for 2, etc, and are of position invariant, i.e. each symbol represents the same value regardless of its position in the number. Since it is very difficult to perform arithmetic calculations with such a number system, positional number system were developed.

Q.5. (c) Octal number system and hexadecimal number system. **(3)**

Ans.

Hexadecimal Numbers	Octal Numbers
It uses 16 different symbols or digits for representing numbers.	Octal numbers use only 8 symbols or digits to represent all the numbers. It can have digits from 0 to 7 only.
The radix or base for hexadecimal numbers is 16.	The radix or the base for octal number is 8.
Easier to represent and remember large numbers.	Easy to represent using octal number system but difficult to remember large numbers.
Example of Hexadecimal number : FF (Equivalent to Two hundred and fifty five in decimal)	Example of Binary number : 377 (Equivalent to Two hundred and fifty five in decimal)

Q.5. (*d*) ASCII coding scheme and EBCDIC coding scheme **(3.5)**

Ans. The American Standard Code for Information Interchange and the Extended Binary Coded Decimal Interchange Code are two character encoding schemes; which are more commonly known by their respective acronyms, ASCII and EBCDIC. The main difference between the two is the number of bits that they use to represent each character. EBCDIC uses 8 bits per character while the original ASCII standard only used 7, due to concerns that using 8 bits for characters that can be represented with 7 is much less efficient.

The main consequence of that difference is the number of characters that can be accommodated with each one. EBCDIC can accommodate up to 28 characters for a total of 256 while the 27 of ASCII has a maximum of 128 characters.

Although EBCDIC was very popular, due largely to the popularity of IBM machines at the time, it had several problems that irritated programmers. The first one is how it arranges the letters of the alphabet. In ASCII, all the letters are in consecutive order. Capital letters are grouped together while small letters also have their own group. In

number of small parts called cells. Each location or cell has a unique address which varies from zero to memory size minus one. For example: if computer has 64k words, then this memory unit has 64 * 1024=65536 memory locations. The address of these locations varies from 0 to 65535.

Features	Primary Memory	Secondary Memory
Definition	The primary memory of a computer is the main memory that is utilized to store data temporarily.	Secondary memory defines to additional storage devices that are utilized to store data permanently.
Accessibility	It is directly accessible by the processor.	It is not directly accessible via the processor.
Nature of Memory	It is both volatile and non-volatile memory.	It is a non-volatile memory in nature.
Other names	It is also known as the main memory of the system.	It is also known as the secondary or auxiliary memory of a computer system.
Formation	It is composed of semiconductors.	It is composed of magnetic and optical materials.
Data	The data that must be executed is copied to the main memory.	It is utilized to store data that requires should be stored permanently.
Access Speed	The speed of accessing data is faster in primary memory.	The speed of accessing data is slower in secondary memory.
Cost	It is more costly than secondary memory.	It is cheaper than primary memory.
Size	The size of primary memory is small.	The size of secondary memory is large.
Memory	It is internal memory.	It is an external memory.
Types	It is mainly of two types: RAM and ROM.	Magnetic memory, semiconductor memory, and optical memory are the three most popular types of secondary memory.
Access	It is accessed via the data bus.	It is accessed via the input-output channel.

Q.3. (b) Explain input and Output devices and give three examples of each input and output device. **(5)**

Ans. Input and output devices are essential components of computer systems

Input Devices: Input devices are hardware components that allow users to send data or commands to a computer. They enable users to input information and control the computer's functions.

You might find it useful to examine your workload to determine whether it accesses data randomly or sequentially. If you find disk access is predominantly random, you might want to pay particular attention to the activities being done and monitor for the emergence of a bottleneck.

Q.9. (b) Primary memory and Secondary memory **(6.25)**

Ans. A computer stores data using several different methods. Therefore, there are different levels of data storage, which may be referred to as primary and secondary storage. A computer's internal hard drive is often considered a primary storage device, while external hard drives and other external media are considered secondary storage devices.

However, primary and secondary storage may also refer specifically to the components inside the computer. In this case, primary storage typically refers to random access memory (RAM), while secondary storage refers to the computer's internal hard drive.

RAM, commonly called "memory," is considered primary storage, since it stores data that is directly accessible by the computer's CPU. RAM is a high-speed storage medium that can be accessed with minimal delay. Because the RAM is connected directly to the CPU via the memory bus, the CPU can access data stored in RAM very quickly. For this reason, RAM is used to store data loaded by active programs and the operating system.

Hard drives are considered secondary storage since they are not connected directly to the CPU. Instead, hard drives send and receive data through an I/O bus, which may pass through a cache or other type of memory before getting to the CPU. Also, hard drives are not as fast a RAM, which means they cannot transfer data as quickly. However, unlike RAM, hard drives retain data when the computer is turned off. This is because hard drives store data magnetically, while RAM requires an electrical current.

While the computer's primary internal hard drive is the most common secondary storage device, other devices may be considered secondary storage devices as well. These include additional internal hard drives, external hard drives, and optical drives, which are used for CDs, DVDs, and other optical media.

Q.9. (c) Optical disk and Hard disk **(6.25)**

Ans. The key difference between optical storage media, such as CDs and DVDs, and magnetic storage media, such as hard drives and old-fashioned floppy disks, is in how computers read and write information to them. One uses light; the other, electromagnetism.

Significance: Computers are binary, meaning that for them to understand information, it has to be boiled down to a series of digits, each of which is a 1 or a 0. Storage media use different methods of representing those digits.

Storage : Magnetic storage uses disks coated with a magnetic material. Each tiny bit of the disk carries a magnetic charge; the direction of that charge determines whether it represents a 1 or a 0. Optical storage, meanwhile, uses disks made of reflective material; how each bit reflects light–or doesn't reflect it–determines whether it's a 1 or a 0.

Access : Magnetic storage devices use "read/write heads," electromagnets that detect (read) or change (write) the magnetization patterns on the disk. Optical storage devices use lasers to read the reflections in the disk or "burn" the data pattern into the disks.

Advantages : In general, it's faster and easier to write data to magnetic storage media. However, data stored on optical media tends to be more durable.

Q.7. Differentiate between the following: (2.5)

(a) Pseudo code and Flowchart

Ans. Flowcharts and pseudocode provide ways for computer programmers and others working on a project to have an upper-level understanding of both the entire project and any algorithms involved in it. Both flowcharts and pseudocode have benefits in describing the logic of the algorithms and can be used at different points in the programming process.

Flowcharts and pseudocode provide ways for computer programmers and others working on a project to have an upper-level understanding of both the entire project and any algorithms involved in it. Both flowcharts and pseudocode have benefits in describing the logic of the algorithms and can be used at different points in the programming process.

A flowchart can illustrate the processes of a software program.

Layout: The layout of flowcharts for a program provides a graphical structure that allows programmers to follow the logical structure of the code. The graphical nature of the flowchart provides another way to look at the sequence of the program, which can be especially beneficial for nonprogramming members of the team who need to understand how the code will work. The layout of pseudocode follows more closely the structure for the code of the program. Pseudocode uses words as opposed to a pictorial representation to illustrate the logic of the algorithm.

Benefits: Flowcharts are especially beneficial for smaller concepts and problems, while pseudocode is more efficient for larger programming problems. Flowcharts provide an easy method of communication about the logic and offer a good starting point for the project because they are easier to create than pseudocode in the beginning stages. Pseudocode provides a beneficial bridge to the project code because it closely follows the logic that the code will. Pseudocode also helps programmers share ideas without spending too much time creating code, and it provides a structure that is not dependent on any one programming language.

Structure: The structure of pseudocode uses a linear text-based structure to organize the logic of the programming problem. It does not need so much detail as to include variables and function names but should include enough detail so that code can be created to follow the same logic. The structure of flowcharts uses symbols and shapes to create a diagram of only the essential parts of the algorithm or problem. While it is sometime not enough to begin coding from, especially for larger systems, it can provide a broad idea of how the system will function.

Depth: Both pseudocode and flowcharts can be either broad and cover only basic concepts of the algorithm or project, or they can cover more detail, making the jump to creating the codes easier. However, pseudocode has more flexibility with detail; too much detail in a flowchart can cause confusion.

Q.7. (*b*) Selection and Iteration (2.5)

Ans. Selection: Sometimes you only want some lines of code to be run only if a condition is met, otherwise you want the computer to ignore these lines and jump over them. This is achieved using IF statements. e.g. If a condition is met then lines 4, 5, 6 are executed otherwise the computer jumps to line 7 without even looking at line 4,5 and 6.

Iteration: Sometimes you want the computer to execute the same lines of code several times. This is done using a loop. There are three types of loops: For loops, while

Examples: gcc compiler which stands for GNU compiler collections, Visual Studio, Intel C++

Interpreter:

⇒ Interpreter is a translator programs which translates high level program into machine level line by line.

⇒ Interpreter first Converts high level language into an intermediate code and then executes it line by line.

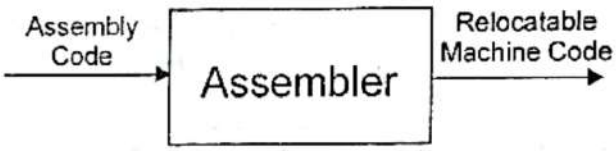
⇒ Translation is a bit slower than compiler.

⇒ In interpreter, an error will be notified but no further code is scanned.

Example: Python

Assembler: Assembler are used to convert assembly language code into machine code. Examples : ACME, AS65 etc

Some compilers perform the task of assembler and directly generate a relocatable machine code instead of assembly code, which is further directly passed to linker/loader. The **assembler** takes as input the assembly code generated by the compiler and translates it into **relocatable machine code.**



However machine code is different from assembly code. **Assembly code** is the **mnemonic** version of machine code. It means it assembly code uses names for representing operations and it even gives names to the memory addresses. On the other hands, the **machine code** uses **binary codes** for representation of operations and memory addresses.

Even the simplest form of assembler performs **two passes** over the input. The **first pass** detects all the **identifiers** in the assembly code that denotes storage location and store them in the **symbol table** (other than compilers symbol table). The **storage location is assigned** to the identifier that is encountered in the first pass.

In the **second pass**, the input is scanned again, and this time the **operation code** are **translated** into a **sequence of bits** representing that operation in the machine code. The second pass also translates **identifiers** into the **addresses** defined in the symbol table. Thus the second pass generates the **relocatable machine code.**

Q. 4. (b) Explain the role of Linker. **(6)**

Ans. Linker: There are certain programs which are large its size and cannot be executed at one go simultaneously. Such programs are divided into subprograms also known as modules. The linker is used to link such small programs to form one large program.

Function of Linker: For most compilers, each object file is the result of compiling one input source code file. When a program comprises multiple object files, the linker combines these files into a unified executable program, resolving the symbols as it goes along.

Linkers can take objects from a collection called a library: Some linkers do not include the whole library in the output they only include its symbols that ale referenced

from other object files or libraries. Libraries exist for diverse purposes, and one or more system libraries are usually linked in by default.

The linker also takes care of arranging the objects in a program's address space. This may involve relocating code that assumes a specific base address to another base. Since a compiler seldom knows where an object will reside, it often assumes a fixed base location (for example, zero). Relocating machine code may involve re-targeting of absolute jumps, loads and stores.

Features of Linker

• Often-used libraries (for example the standard system libraries) need to be stored in only one location, not duplicated in every single binary.

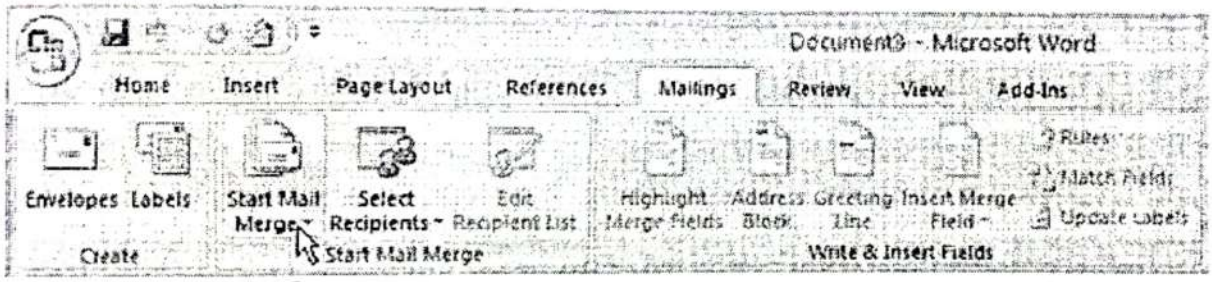
• If a bug in a library function is corrected by replacing the library, all programs using it dynamically will benefit from the correction after restarting them. Programs that included this function by static linking would have to be re-linked first.

Q. 5. (a) Explain the procedure of mail merge in MS-Word. **(6)**

Ans. Mail Merge is a useful tool that will allow you to easily produce multiple letters, labels, envelopes, and more using information stored in a list, database, or spreadsheet.

To use Mail Merge:

- Select the **Mailings** on the Ribbon.
- Select the **Start Mail Merge** command.



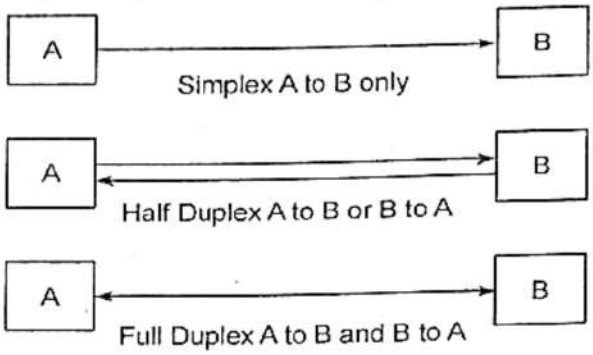
- Select **Step by Step Mail Merge Wizard**.

The Mail Merge task pane appears and will guide you through the **six main steps** to complete a merge. You will have several decisions to make during the process. The following is an example of how to create a form letter and merge the letter with a data list.

Steps 1-3

- Choose the type of document you want to create. In this example, select **Letters**.
- Click **Next:Starting document** to move to Step 2.
- Select **Use the current document**.
- Click **Next:Select recipients** to move to Step 3.
- Select the **Type a new list** button.
- Click **Create** to create a data source. The **New Address List** dialog box appears.
- Click **Customize** in the dialog box. The Customize Address List dialog box appears.
- Select any field you do not need, and click **Delete**.
- Click **Yes** to confirm that you want to delete the field.

multiple channels on the same medium. A channel is a distinct communication path between two or more nodes, much as a lane0000 which is a distinct transportation path on a freeway. Channels may be separated either logically or physically.



Various Data Transmission Mode

Q. 1. (f) Explain ROM, PROM. EPROM and UVEPROM. **(5)**

Ans. ROM(Read Only Memory): The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM stores such instructions that are required to start a computer. This operation is referred to as **bootstrap**. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.

PROM (Programmable Read Only Memory): PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip, there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

EPROM: It stands for Erasable Programmable Read-Only Memory . It overcomes the disadvantage of PROM that once programmed, the fixed pattern is permanent and cannot be altered. If a bit pattern has been established, the PROM becomes unusable, if the.bit pattern has to be changed.

This problem has been overcome by the EPROM, as when the EPROM is placed under a special ultraviolet light for a length of time, the shortwave radiation makes the EPROM return to its initial state, which then can be programmed accordingly. Again for erasing the content, PROM programmer or PROM burner is used.

UVEPROM: It stands for 'UltraViolet Erasable Programmable Read-Only Memory'. Chips may be erased through the use of ultraviolet light and then can have new data written to them.

UNIT-I

Q. 2. (a) Discuss the evolution of computers with the technologies used from first to fifth generation. **(6.5)**

Ans. "Generation" in computer terminology means a step of changing technology. It provides the framework for the growth of computer industry. There are five generations of computer, with the first generation computers being those which became commercially available in the early 1950s.

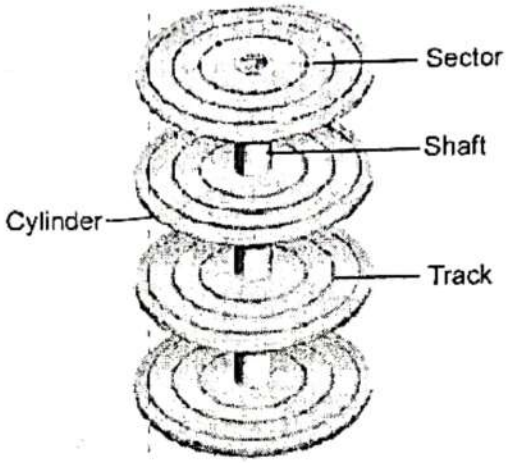
First Generation of Computers (1942-1955)

The first generation of computer was marked by the use of vacuum tubes for the electronic components and the use of either electrostatic tubes (i.e. cathode ray tubes) or mercury delay lines for storage.

Key Hardware: The period of first generation was 1942-1955. The computers of first generation used vacuum tubes as the basic components for memory and circuitry

Cylinder: For faster access of data, corresponding tracks on each surface is known as Cylinder. For e.g. 5th track of all surfaces is known as 5th Cylinder of disk pack.

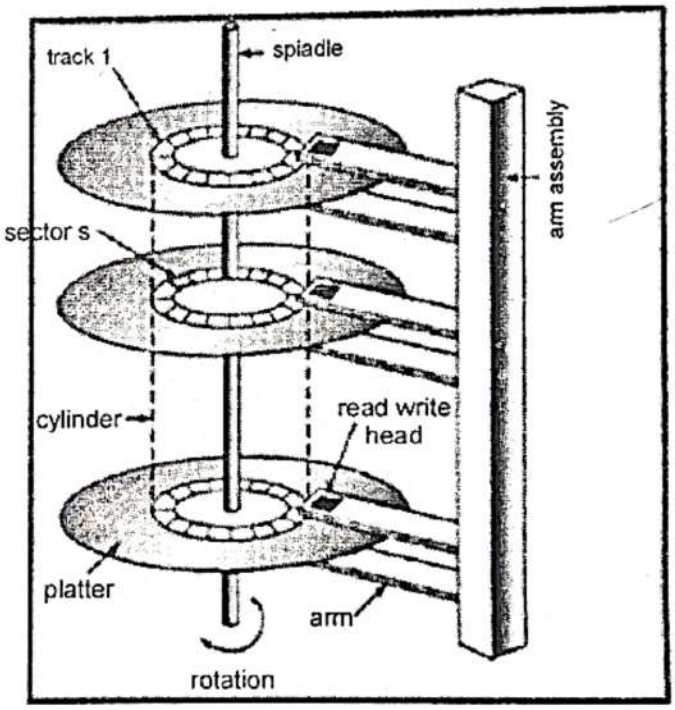
Tracks, Cylinders, and Sectors



- Disk Drive:
  - Arm Assembly
  - Read/Write head
  - Motor to rotate Arm
  - Shaft
  - Motor to rotate Shaft

Disk Controller

Interprets the commands for operating the disk drive.



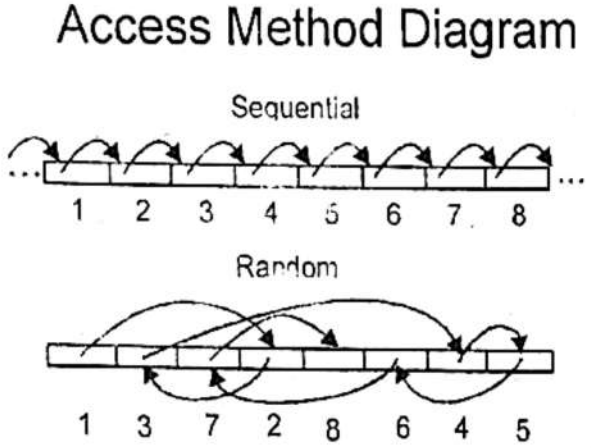
Q. 3. (a) Explain Serial Access Memory. **(6)**

Ans. Sequential/Serial Access Memory (SAM) is a class of data storage devices that read their data in sequence. This is in contrast to random access memory (RAM) where data can be accessed in any order. Sequential access devices are usually a form of magnetic memory.

While sequential access memory is read in sequence, accesses can still be made to arbitrary locations by "seeking" to the requested location. This operation, however, is often relatively inefficient (due to more seek time, rotational latency).

Magnetic sequential access memory is typically used for secondary storage in general-purpose computers due to their higher density at lower cost compared to RAM, as well as resistance to wear and non-volatility. Examples of SAM devices still in use include hard disks, CD-ROMs and magnetic tapes. Historically, drum memory has also been used.

A common example of sequential access is with a tape drive, where the device must move the tape's ribbon forward or backward to reach the desired information. The opposite would be RAM (Random Access Memory) that can go anywhere on the chip to access the information.



Q. 3. (b) Differential between Magnetic Tape and Magnetic Hard Disk

Ans. Magnetic tape and magnetic disk both stores the data magnetically. The surface of a magnetic tape and the surface of a magnetic disk are covered with a magnetic material which helps in storing the information magnetically. Both are **non-volatile storage**. Despite these similarities both differs in many aspects from their appearance to their working, their cost and much more.

BASIS	MAGNETIC TAPE	MAGNETIC DISK
Basic	Used for backup, and storage of less frequently used information.	Used as a secondary storage.
Physical	Plastic thin, long, narrow strip coated with magnetic material.	Several platters arranged above each other to form a cylinder, each platter has a read-write head.
Use	Idle for sequential access.	Idle for random access.
Access	Slower in data accessing.	Fast in data accessing.
Update	Once data is fed, it can't be updated.	Data can be updated.
Data loss	If the tape is damaged, the data is lost.	In a case of a head crash, the data is lost.
Storage	Typically stores from 20 GB to 200 GB.	From Several hundred GB to Terabytes.
Expense	Magnetic tapes are less expensive.	Magnetic disk is more expensive.

UNIT-II

Q. 4. (a) Differentiate between Assembler, Compiler and Interpreter. (6.5)

Ans. Compiler:

⇒ Compiler is a translator which translates high level Languages like C, C++ to Machine code.

⇒ Comp er Scans the entire program at once and then converts into Machine code.

⇒ Execution of programs are faster in Compilers.

⇒ Compilers translates error report after translation of entire code.

and then CPU can access it. The secondary memory is concerned with magnetic memory. Secondary memory can be stored on storage media like floppy disks, magnetic disks, magnetic tapes. This memory can also be stored optically on Optical disks - CD-ROM.

Characteristic of Secondary Memory

- These are magnetic and optical memories.
- It is known as backup memory.
- It is non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without secondary memory.
- Slower than primary memories.

Q. 3. (b) Different between static and dynamic RAM. **(6)**

Ans. SRAM (static RAM) is random access memory (RAM) that retains data bits in its memory as long as power is being supplied. Unlike dynamic RAM (DRAM), which stores bits in cells consisting of a capacitor and a transistor, SRAM does not have to be periodically refreshed. Static RAM provides faster access to data and is more expensive than DRAM. SRAM is used for a computer's cache memory and as part of the random access memory digital-to-analog converter on a video card.

UNIT-II

Q. 4. (a) What are functionalities of operating system? Explain in detail.(6.5)

Ans. Functionality performed by Operating System:-

- **Process management:** It deals with running multiple processes. Most operating system allow a process to be assigned a priority which affects its allocation of CPU time. Interactive operating systems also employ some level of feedback in which the task with which the user is working receives higher priority. In many systems there is a background process which runs when no other process is waiting for the CPU.
- **Memory management:** The memory manager in an OS coordinates the memories by tracking which one is available, which is to be allocated or deallocated and how to swap between the main memory and secondary memories. The operating system tracks all memory used by each process so that when a process terminates, all memory used by that process will be available for other processes.
- **Disk and file systems:** Operating systems have a variety of native file systems that controls the creation, deletion, and access of files of data and programs.
- **Networking:** Most current operating systems are capable of using the TCP/IP networking protocols. This means that one system can appear on a network of the other and share resources such as files, printers, and scanners. Many operating systems also support one or more vendor-specific legacy networking protocols as well.
- **Security:** Most operating systems include some level of security.
- **Device drivers:** A device driver is a specific type of computer software developed to allow interaction with hardware devices. Typically this constitutes an interface for communicating with the device, through the specific computer bus or communications subsystem that the hardware is connected to, providing commands to and/or receiving data from the device, and on the other end, the requisite interfaces to the operating system and software applications.

EBCDIC, the letters are grouped 9 at a time. This non-intuitive layout comes from the EBCDIC's punch card origins and is quite difficult for programmers to deal with.

1.EBCDIC uses 8 bits while ASCII uses 7 before it was extended

2.EBCDIC contained more characters than ASCII

3.ASCII uses a linear ordering of letters while EBCDIC does not

4.Different versions of ASCII are mostly compatible while different versions of EBCDIC are not

5.EBCDIC isn't compatible with modern encodings while ASCII is.

UNIT III

Q.6. Answer the following

Q.6. (a) Define and distinguish between application software and system software. Explain the differences among assemblers, compilers and interpreters. (6)

Ans.

Basis	Application Software	System Software
Definition	Application software is computer software designed to help the user to perform specific tasks.	System software is computer software designed to operate the computer hardware and to provide a platform for running application software.
Purpose	It is specific purpose software.	It is general-purpose software.
Classification	• Package Program, • Customized Program	• Time Sharing, • Resource Sharing, • Client Server • Batch Processing Operating System • Real time Operating System • Multi-processing Operating System • Multi-programming Operating System • Distributed Operating System
Environment	Application Software performsin a environment which created by System/ Operating System	System Software Create his own environment to run itself and run other application.
Execution Time	It executes as and when required.	It executes all the time in computer.
Essentiality	Application is not essential for a computer.	System software is essential for a computer
Number	The number of application software is much more than system software.	The number of system software is less than application software.

There are three types of translator programs i.e. Assembler, Compilers and Interpreters.

Assembler:

Assembler is a computer program which is used to translate program written in Assembly Language in to machine language. The translated program is called as object program. Assembler checks each instruction for its correctness and generates diagnostic messages, if there are mistakes in the program. Various steps of assembling are:

1. Input source program in Assembly Language through an input device.
2. Use Assembler to produce object program in machine language.
3. Execute the program.

Compiler:

A compiler is a program that translates a programme written in HLL to executable machine language. The process of transferring HKK source program in to object code is a lengthy and complex process as compared to assembling. Compliers have diagnostic capabilities and prompt the programmer with appropriate error message while compiling a HLL program. The corrections are to be incorporated in the program, whenever needed, and the program has to be recompiled. The process is repeated until the program is mistake free and translated to an object code. Thus the job of a complier includes the following:

1. To translate HLL source program to machine codes.
2. To trace variables in the program
3. To include linkage for subroutines.
4. To allocate memory for storage of program and variables.
5. To generate error messages, if there are errors in the program.

Interpreter:

The basic purpose of interpreter is same as that of complier. In compiler, the program is translated completely and directly executable version is generated. Whereas interpreter translates each instruction, executes it and then the next instruction is translated and this goes on until end of the program. In this case, object code is not stored and reused. Every time the program is executed, the interpreter translates each instruction freshly. It also has program diagnostic capabilities. However, it has some disadvantages as below:

1. Instructions repeated in program must be translated each time they are executed.
2. Because the source program is translated fresh every time it is used, it is slow process or execution takes more time. Approx. 20 times slower than complier.

Q.6. (*b*) Classify the operating system into different types based on their processing capability. List the main function of the operating system and describe in details. **(6.5)**

Ans. Batch Processing System: Data or programs are collected grouped and processed at a later date

- Example of Use: Payroll, stock control and billing systems

Real-time Systems: Inputs immediately affect the outputs. Timing is critical i.e. they are capable of influencing the source of the data e.g. control where data from sensors is processed immediately and affect the outputs - controlling some device. Timing is critical and the term real-time control system.

Q. 7. (a) Convert the following: **(6.5)**

(i) $(1101)_2 = (?)_8$

(ii) $(54AA)_H = (?)_8$

(iii) $(707)_8 = (?)_z$

(iv) $(49.54)_{10} = (?)_z$

Ans. (iv) $(49.54)_{10} = (\ ?\ )_z$

Here we will convert the decimal integral number 49 into binary separately and the fraction part .54 separately

Conversion of 49 to binary

Divisor	Base	10 number	Remainder
2	)	49	1
2	)	24	0
2	)	12	0
2	)	6	0
2	)	3	1
2	)	1	1
0			

Therefore $(49)_{10} = (110001)_2$

And to get the binary equivalent of 0.54

Multiply the fraction by 2 and separate the integer and again multiply the fraction part by 2 and repeat the same process till you get fraction part as 0 or continue the process till the number of places you want to write the binary fraction

Fraction	* 2	integer part	Fraction part to be carried forward
0.54	* 2	1	0.08
0.08	* 2	0	0.16
0.16	* 2	0	0.32
0.32	* 2	0	0.64
0.64	* 2	1	0.28

In this case as we don't have the fractional part as Zero, so if we take five number of places then 0.10001 is the equivalent of 0.54. Now we append the two values and get the binary equivalent of $(49.54)_{10}$ as $(110001.10001)_2$

Q. 7. (b) Explain EBCDIC code functionality in computer system. **(6)**

Ans. EBCDIC Codes :- Extended Binary Coded Decimal Interchange Code (EBCDIC)

It is an 8-bit character encoding used on IBM mainframes and AS/400s. It is descended from punched cards and the corresponding six bit binary-coded decimal code that most of IBM's computer peripherals of the late 1950s and early 1960s used. Outside of such IBM systems and compatible systems from other companies, ASCII (and its descendants such as Unicode) are normally used instead. EBCDIC is generally considered an anachronism. It comes in atleast six slightly differing forms.

UNIT-IV

Q. 8. (a) Discuss various data transmission media.

Ans. Transmission media is used between sender and receiver of data to transmit the data. The transmission media is of two types guided and unguided.

Guided Media: In this transmission media the data is transferred using some sort of wires. It is also know as wired media of transmission.

1. Twisted pair
2. Coaxial cable
3. Fiber Optic

Unguided Media: Transmission media then looking at analysis of using them unguided transmission media is data signals that flow through the air. They are not guided or bound to a channel to follow. Following are unguided media used for data communication:

1. Radio Transmission
2. Microwave
3. Satellite Communication

Twisted Pair: A twisted pair cable is made of two plastic insulated copper wires twisted together to form a single media. Out of these two wires only one carries actual signal and another is used for ground reference. The twists between wires are helpful in reducing noise (electro-magnetic interference) and crosstalk.

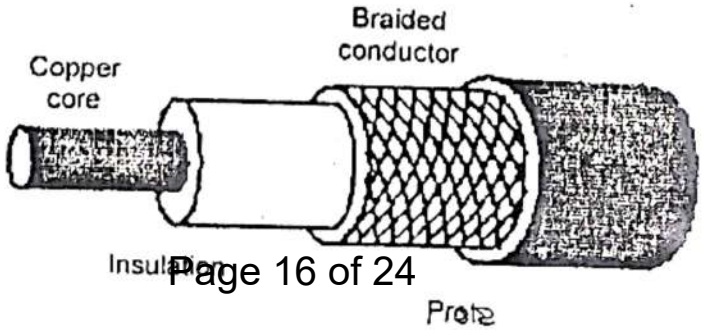
Features of Twisted Pair

- Twisting reduces interference (two parallel wires constitute a simple antenna; a twisted pair does not.)
- Cheap medium
- Commonly used for communications within buildings,and in telephone networks
- Produced in unshielded (UTP) and shielded (STP) forms, and in different performance categories.
- Cables may hold hundreds of pairs. Neighbor pairs typically have different twist lengths to reduce crosstalk.

Unshielded Twisted Pair (UTP) : UTP is the copper media, inherited from telephony, which is being used for increasingly higher data rates, and is rapidly becoming the de facto standard for horizontal wiring, the connection between, and including, the outlet and the termination in the communication closet.

Shielded Twisted Pair (STP): STP is heavier and more difficult to manufacture, but it can greatly improve the signaling rate in a given transmission scheme Twisting provides cancellation of magnetically induced fields and currents on a pair of conductors.

Coaxial Cable: Coaxial cable is a two-conductor cable in which one conductor forms an electromagnetic shield around the other. The two conductors are separated by insulation. It isi a constant impedance transmission cable. This media is used in base band and broadband transmission. Coaxial cables do not produce external electric and magnetic fields and are not affected by them. This makes them ideally suited, although more expensive, for transmitting signals.



Because of its structure coax cables are capable of carrying high frequency signals than that of twisted pair cables. The wrapped structure provides it a good shield against noise and cross talk. Coaxial cables provide high bandwidth rates of up to 450 mbps.

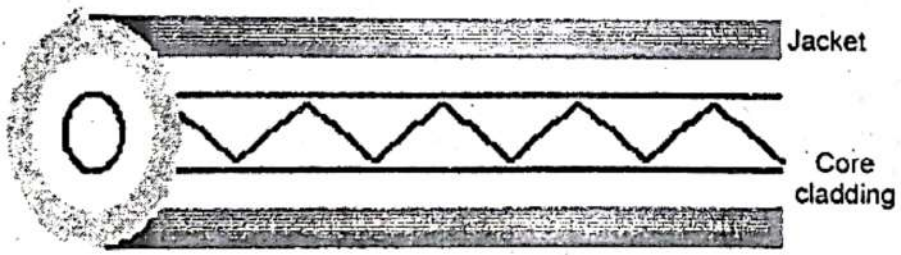
There are three categories of Coax cables namely, RG-59 (Cable TV), RG-58 (Thin Ethernet) and RG-11 (Thick Ethernet. RG stands for Radio Government.

Cables are connected using BNC connector and BNC-T. BNC terminator is used to terminate the wire at the far ends.

Fiber Optics: Optical fiber consists of thin glass fibers that can carry information the workstations together, son at frequencies in the visible light spectrum and beyond. The typical optical fiber consists of a very narrow strand of glass called the core. Around the core is a concentric layer of glass called the cladding.

A typical core diameter is 62.5 microns .Typically cladding has a diameter of 125 microns. Coating the cladding is a protective coating consisting of plastic, it is called the Jacket. An important characteristic of fiber optics is refraction. Refraction is the characteristic of a material to either pass or reflect light. When light passes through a medium, it "bends" as it passes from one medium to the other. An example of this is when we look into a pond of water If the angle of incidence is small, the light rays are reflected and do not pass .into the water.

If the angle of incident is great, light passes through the media but is bent or I refracted. Optical fibers work on the principle that the core refracts the light and the I cladding reflects the light. The core refracts the light and guides the light along its path. The cladding reflects any light back into the core and stops light from escaping through it - it bounds the medium



Radio Transmission

Radio wave transmission is of three types

1. Ground Wave
2. Ionospheric
3. Line of Sight (LOS)

Ground wave propagation follows the curvature of the Earth. Ground waves have carrier frequencies up to 2 MHz. AM radio is an example of ground wave propagation.

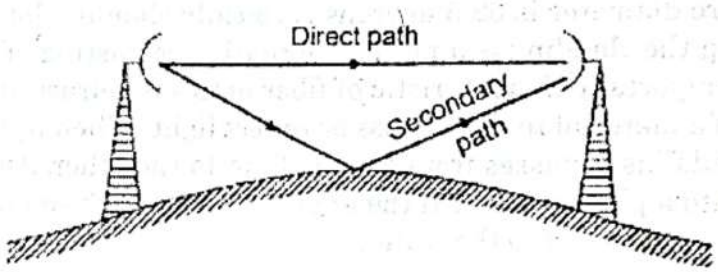
Ionospheric propagation bounces off of the Earth's ionospheric layer in the upper atmosphere.It is sometimes called double hop propagation. It operates in the frequency range of 30 - 85 MHz. Because it depends on the Earth's ionosphere, it changes with the weather and time of day. The signal bounces off of the ionosphere and back to earth. Ham radios operate in this range.

Line of sight propagation transmits exactly in the line of sight. The receive station must be in the view of the transmit station. It is sometimes called space waves or tropospheric propagation. It is limited by the curvature of the Earth for ground-based stations (100 km, from horizon to horizon). Reflected waves can cause problems. Examples of line of sight propagation are: FM radio, microwave and satellite.

Radio Frequencies : The frequency spectrum operates from 0 Hz (DC) to gamma rays (1019 Hz). Radio frequencies are in the range of 300 kHz to 10 GHz. We are seeing an emerging technology called wireless LANs. Some use radio frequencies to connect the workstations together, some use infrared technology.

Microwave : Microwave transmission is line of sight transmission. The transmit station must be in visible contact with the receive station. This sets a limit on the distance between stations depending on the local geography. Typically the line of sight due to the Earth's curvature is only 50 km to the horizon! Repeater stations must be placed so the data signal can hop, skip and jump across the country.

Microwaves operate at high operating frequencies of 3 to 10 GHz. This allows them to carry large quantities of data due to their large bandwidth.



Advantages:

(a) They require no right of way acquisition between towers.

(b) They can carry high quantities of information due to their high operating frequencies.

(c) Low cost land purchase: each tower occupies only a small area.

(d) High frequency/short wavelength signals require small antennae.

Disadvantages:

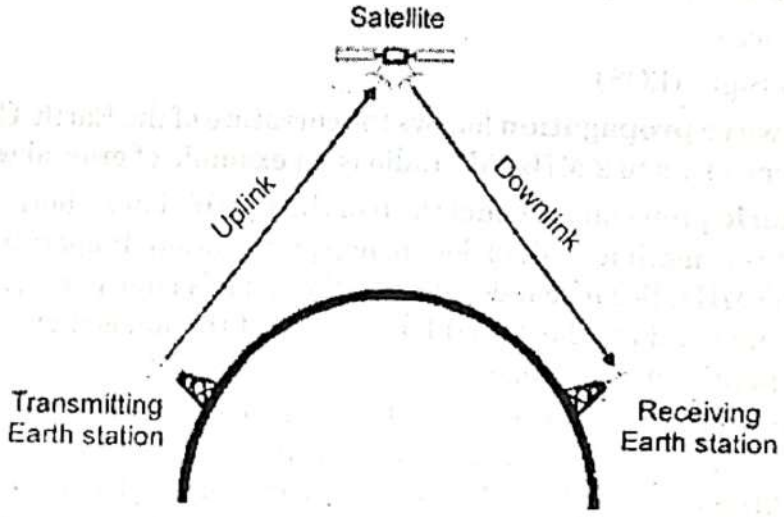
(a) Attenuation by solid objects: birds, rain, snow and fog.

(b) Reflected from flat surfaces like water and metal.

(c) Diffracted (split) around solid objects.

(d) Reflected by atmosphere, thus causing beam to be projected away from receiver.

Satellite: Satellites are transponders (units that receive on one frequency and retransmit on another) that are set in geostationary orbits directly over the equator.



These geostationary orbits are 36,000 km from the Earth's surface. At this point the gravitational pull of the Earth and the centrifugal force of Earth's rotation are

with each other. The firewall is used to switch between internet and intranet and lets only the people who can log in with the help of passwords or by internet protocol addresses. It can be used by individuals or a group of folks depending on the level of requirement.

Intranet	Extranet
An intranet is unique to an organization or group of people who work together at a place	Extranet is for individuals or group of personnel who want to send private information
Privacy	
Private intermediately	Extremely Private
Dependency	
Independent yet dependent on internet	Dependent on internet and intranet
Firewall	
Can have	Yes

Q. 8. (b) Discuss client server architecture in detail. **(6)**

Ans. Refer Q.9.(a) from End Term Examination December 2017.

Q. 9. Write short notes on (any three) **(12.5)**

(a) World wide web

Ans. The World Wide Web (WWW) is combination of all resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP).

A broader definition comes from the World Wide Web Consortium (W3C):

"The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge."

The Web, as it's commonly known, is often confused with the internet. Although the two are intricately connected, they are different things. The internet is, as its name implies, a network —a vast, global network that incorporates a multitude of lesser networks. As such; the internet consists of supporting infrastructure and other technologies. In contrast, the Web is a communications model that, through HTTP, enables the exchange of information over the'internet.

Q.9. (b) FTP

Ans. FTP:- File Transfer Protocol (FTP) is a standard network protocol used to transfer files from one host or to another host over a TCP-based network, such as the Internet.

FTP is built on a client-server architecture and uses separate control and data connections between the client and the server. FTP users may authenticate themselves using a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it. For secure transmission that hides (encrypts) the username and password, and encrypts the content, FTP is often secured with SSL/TLS ("FTPS").

The first FTP client applications were command-line applications developed before operating systems had graphical user interfaces, and are still shipped with most Windows, Unix, and Linux operating systems. Dozens of FTP clients and automation utilities have since been developed for desktops, servers, mobile devices, and hardware, and FTP has been incorporated into hundreds of productivity applications, such as web page editors.

FTP (File Transfer Protocol) is a way to upload and download files on the Internet. Downloading and uploading are the two basic processes used on the Internet. Downloading is a process of transferring data from the Internet to a local computer whereas uploading is a reverse process, i.e. transferring data from a local computer to

the Internet. Typically, a site on the Internet stores a number of files (they could be application executables, graphics, or audio clips) and runs an FTP server application that waits for transfer requests. To download a file to your own system, you run an FTP client application that connects to the FTP server and requests a file from a particular directory or folder. Files can be uploaded to the FTP server only if appropriate access is granted. FTP differentiates between text files usually ASCII (American Standard Code for Information Interchange) and binary files (such as images and application executables), so care should be taken in specifying an appropriate type of transfer.

When an Internet site makes files available to the general public, this is called "anonymous" FTP. A password does not need to be supplied, although the user e-mail address is typically requested. Some sites have confidential files or directories and an FTP login and password is needed to download or upload.

Q.9. (c) Telnet

Ans. TELNET (TEL ecommunication **NET**work) is a network protocol used on the Internet or local area network (LAN) connections. It was developed in 1969 beginning with RFC 15 and standardized as IETF STD 8, one of the first Internet standards.

It is a network protocol used on the Internet or local area networks to provide a bidirectional interactive communications facility. Typically, telnet provides access to a command-line interface on a remote host via a virtual terminal connection which consists of an 8-bit byte oriented data connection over the Transmission Control Protocol (TCP). User data is interspersed in-band with TELNET control information. The user's computer, which initiates the connection, is referred to as the local computer. The computer being connected to, which accepts the connection, is referred to as the remote computer. The remote computer can be physically located in the next room, the next town or in another country.

The network terminal protocol (TELNET) allows a user to log in on any other computer on the network. We can start a remote session by specifying a computer to connect to. From that time until we finish the session, anything we type is sent to the other computer.

The Telnet program runs on the computer and connects your PC to a server on the network. We can then enter commands through the Telnet program and they will be executed as if we were entering them directly on the server console. This enables we to control the server and communicate with other servers on the network. To start a Telnet session, we must log in to a server by entering a valid username and password. Telnet is a common way to remotely control Web servers.

The term **telnet** also refers to software which implements the client part of the protocol.

Q.9. (d) HTTP

Ans. HTTP(*HyperText Transfer Protocol)* used mainly to access data on the World Wide Web. HTTP is a Server and Client communication Protocol, which is primarily set of rules for formating and transferring webpage data (text, images, video and Multimedia files) over the world wide web. This is the Protocol used to create communication between Web Servers and Web Users. HTTP is an application layer Protocol that works on the top of the TCP/IP suite of Protocols. HTTP protocol basically uses server and client model. It acts as a request-response protocol. For Example, A

client which is use web browser and a server is a Web host that hosts the website. Whenever a client transmits a request to the Website server, HTTP protocol proceeds that request and creates a connection between client and server through TCP. After that HTTP sends a request to the server, which picks up the requested data and HTTP sends the response back to the client.

Features of HTTP Protocol

The features of the http protocol are as follows:

• **Http is Connectionless**: The http client, i.e., the web browser makes an http request and waits for the server to respond. Now, it is the task of the server to process the request made by the client. So after processing, the server gives the response to the client. After receiving the response, the client disconnects the connection.

• **Http is media independent**: Here, media independent means that any data can send. Also, we have to mention the content type as per the requirement of the client and the server.

• **Http is stateless**: http is a stateless protocol. Only during the current request, the client and the server know about each other and when the connection disconnects, both client and the server forgets about each other. Due to this nature, both the client and the server do not retain the information between the different requests processed.

4. Magnetic disk access the data faster than the magnetic tape.

5. Magnetic tape can not be updated once written whereas, magnetic disk can be updated.

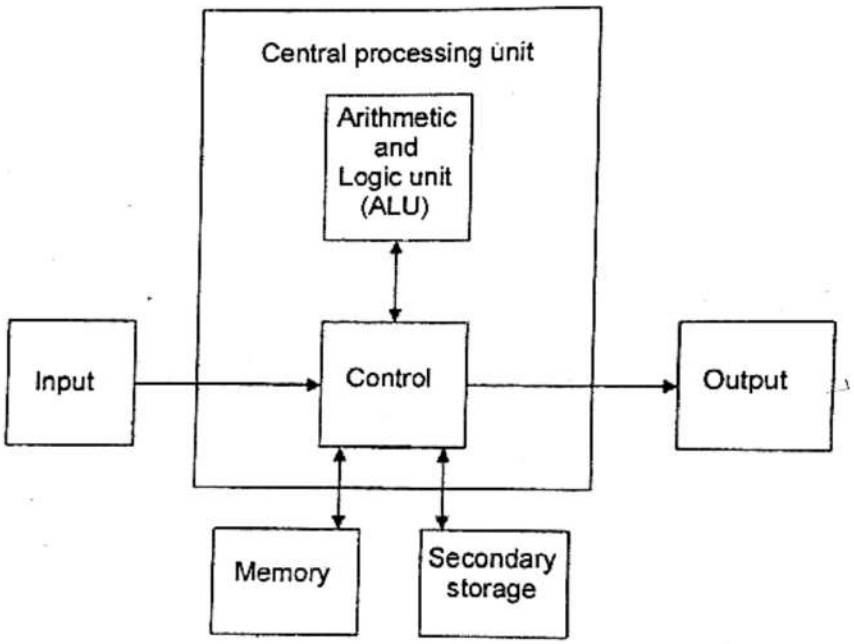
6. If the magnetic tape is damaged data can be lost whereas, in the case of the magnetic disk a head crash can cause data loss.

7. Magnetic tape has a storage capacity of 20 GB to 200 GB whereas, the storage capacity of the magnetic disk if from several hundred GB to Tera bytes.

8. Magnetic tape is less expensive as compared to the magnetic disk.

Q. 1. (b) Draw the block diagram of computer with various components and discuss their functioning in detail. (5)

Ans. Block Diagram of Computer:



Input unit: The input device is used to enter data and information into a computer. The devices like keyboard, mouse and scanner are commonly used as input devices. A keyboard is used to enter alphanumeric characters and symbols. The mouse is used to pick or select a command from the monitor screen. A scanner is used to scan an image or read a barcode and so on.

Central Processing Unit: Central Processing Unit (CPU) is the main component or "brain" of a computer. It performs all the processing of input data. Its function is to fetch, examine and execute the instructions stored in the main memory of a computer. In microcomputers, CPU is built on a single chip or Integrated Circuit (IC) and is called a microprocessor. A CPU consists of the following distinct parts:

- Arithmetic Logic Unit (ALU)
- Control Unit (CU).

Arithmetic Logic Unit (ALU): The arithmetic and logic unit of CPU is responsible for all arithmetic operations like addition, subtraction, multiplication and division as well as logical operations, such as less than, equal to and greater than. All calculations and comparisons are performed in arithmetic logic unit.

Control Unit: The control unit is responsible for controlling the transfer of data and instructions among other units of a computer. It is considered as the "central nervous

system" of a computer as it manages and coordinates all the units of computer. It obtains the instructions from the memory, interprets them and directs the operation of computer. It also performs the physical data transfer between memory and peripheral devices.

Memory Unit: The memory unit is the unit where all the input data and results stored. The CPU memory is also called as memory register. The memory of a computer is also available in the form of Random Access Memory (RAM). RAM is a semiconductor chip. RAM is considered as a volatile memory, it means as long power is supporting information stored in it remain. Once the power is lost, the information stored in the RAM also get erased. Microcomputers contains read Only Memory (ROM). ROM contains instructions for the microcomputers. Microcomputers use ROM, programmable read only memory (PROM), and erasable programmable read-only memory (EPROM) to store selected application programs. The contents of ROM are determined when the chips are manufactured. The ROM memory is considered as non volatile, means the information is not get erased even when power is failed. The most important ROM chip(s) we should know about is the Basic Input/output system or BIOS. The BIOS is a collection of small computer programs built into a ROM chip.

On personal computer there are three types of memory. They are

(1) Conventional memory: The memory into which we load our software and work files. Conventional memory also known as base or low memory is any memory below 1M (1024) although only 640k of it is directly available for our work.

(2) Extended memory (XMS): Memory above 1M. This type of memory is usually not directly available to our software.

(3) Expanded memory (EMS): To expand the memory by reserving a special peephole of 64kb of memory to be used when the computer requests certain data not immediately available from RAM. Usually a software utility called an Expanded Memory Manager (EMM) manages this expanded memory.

Output Unit: The output device is used to display or print result from a computer. Monitor, printer and plotter are commonly used output devices. A monitor is used to display the result in the form of text and graphics. The printer is used to print the result. A plotter is used to plot or print graphical result from a computer. Note that a result displayed in a monitor is temporary and it disappears when the next result is displayed, whereas the output printed using a printer or a plotter is permanent and these printouts can be used for any business correspondence or documentation. Normally soft copy is referred to information that is stored on the storage device. A hard copy refers to a print out showing the information.

Storage Unit: Storage unit provides space for storing data, instructions, intermediate results and final results.

Functions of Storage Unit

(1) Store data, programs and software.

(2) Store intermediate results.

(3) Store final results.

Example of Storage Unit: Hard-Disk, RAM, DVD, CD and ROM etc.

Q. 1. (c) Describe the various network topologies with examples. (5)

Ans. Topology refers to the way in which the nodes of a network are linked together. It determines the data paths that may be used between any pair of nodes in the network.

Choice of network topology depends on following factors.

1. Desired performance
2. Desired reliability
3. Number of nodes
4. Expandability of the system
5. Cost
6. Delay in data transmission