1.   Introduction

1.1. Charles Babbage (1791-1871)

Creator of the Analytical Engine - the first general-purpose digital computer (1833)

The Analytical Engine was not built until 1943 (in the form of the Harvard Mark I)

1.2. The Analytical Engine

A programmable, mechanical, digital machine

Could carry out any calculation

Could make decisions based upon the results of the previous calculation

Components: input; memory; processor; output

1.3. Ada, Countess of Lovelace (1815-52)

Babbage: the father of computing

Ada: the mother?

Wrote a program for computing the Bernoulli's sequence on the Analytical Engine -

World's 1st computer program

Ada: A programming language specifically designed by the US Dept of Defense for

Developing military applications was named Ada to honor her contributions towards

Computing

A lesson that we all can learn from Babbage's Life

Charles Babbage had huge difficulties raising money to fund his research as a last resort; he designed a clever mathematical scheme along with Ada, the Countess of Lovelace

It was designed to increase their odds while gambling. They bet money on horse races to raise enough money to support their research experiments

Guess what happened at the end? The lost every penny that they had.

2.   Computer Types According to Capability

Supercomputers

A supercomputer is a computer that performs at or near the currently highest operational rate for computers. A supercomputer is typically used for scientific and engineering applications that must handle very large databases or do a great amount of computation (or both). At any given time, there are usually a few well-publicized supercomputers that operate at the very latest and always incredible speeds. Perhaps the best-known builder of supercomputers has been Cray Research, now a part of Silicon Graphics. Some supercomputers are at "supercomputer center," usually university research centers, some of which, in the United States, are interconnected on an Internet backbone (A backbone is a larger transmission line that carries data gathered from smaller lines that interconnect with it) known as vBNS or NSFNet.

At the high end of supercomputing are computers like IBM's "Blue Pacific," announced on October 29, 1998. Built in partnership with Lawrence Livermore National Laboratory 15000 times faster than the average personal computer. It consists of 5,800 processors containing a total of 2.6 trillion bytes of memory and interconnected with five miles of cable.

Mainframe Computers

A very large and expensive computer capable of supporting hundreds or even thousands of users simultaneously. In the hierarchy that starts with a simple microprocessor (in watches, for example) at the bottom and moves to supercomputers at the top, mainframes are just below supercomputers. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe. The distinction between small mainframes and minicomputers is vague (not clearly expressed), depending really on how the manufacturer wants to market its machines.

Servers / Minicomputers

A midsized computer. In size and power, minicomputers lie between workstations and mainframes. In the past decade, the distinction between large minicomputers and small mainframes has blurred, however, as has the distinction between small minicomputers and workstations. But in general, a minicomputer is a multiprocessing system capable of supporting from 4 to about 200 users simultaneously.

Desktops

These are also called microcomputers. Low-end desktops are called PC's and high-end ones "Workstations".

These are generally consisting of a single processor only, sometimes 2, along with MB's of memory, and GB's of storage. PC's are used for running productivity applications, Web surfing, messaging. Workstations are used for more demanding tasks like low-end 3-D simulations and other engineering & scientific apps. These are not as reliable and fault-tolerant as servers. Workstations cost a few thousand dollars; PC around a 7000-15000.

Portables

Portable computer is a personal computer that is designed to be easily transported and relocated, but is larger and less convenient to transport than a notebook computer. The earliest PCs designed for easy transport were called portables. As the size and weight of most portables decreased, they became known as laptop computer and later as notebook computer. Today, larger transportable computers continue to be called portable computers. Most of these are special-purpose computers - for example, those for use in industrial environments where they need to be moved about frequently.

PDA (personal digital assistant) is a term for any small mobile hand-held device that provides computing and information storage and retrieval capabilities for personal or business use, often for keeping schedule calendars and address book information handy.

The term handheld is a synonym. Many people use the name of one of the popular PDA products as a generic term. These include Hewlett-Packard's Palmtop and 3Com's Palm Pilot.

Ranking w.r.t. installed number

➢ PC's

➢ PDA's

➢ Workstations

➢ Servers

➢ Wearable (picture is provided)

➢ Mainframes

➢ Supercomputers

3. What is computer? Write down its characteristics and uses.

COMPUTER

Introduction

The 'Computer' is an English word. This is derived from the English word 'compute'. 'Compute' is derived from a Latin word 'Computare' which means to calculate something.

Definition

"Computer is normally considered to be a calculating device that can perform arithmetic operations at enormous speed." *OR* "An electronic device, which is used to take input, store, retrieves and process data according to the instructions given by its user and gives us output."

CHARACTERISTICS OF COMPUTER

Speed

A computer is a very fast electronic device. It can perform in a few seconds the amount of work that a human being can do in an entire year. While talking about the speed of a computer, we do not talk in terms of seconds or even milliseconds. Our units of speed are the microseconds, the nanoseconds and even the Pico-seconds.

Accuracy

Accuracy means correctness. The accuracy of a computer is consistently high and the degree of accuracy of a particular computer depends upon its design. Errors can occur in a computer, but these are mainly due to human rather than technological weaknesses.

Diligence

Diligence means un-tiredness. Unlike human being, a computer is free from tiredness, lack of concentration etc. and hence can work for hours together without creating any error and without grumbling. If ten million calculations have to be performed, a computer will perform the ten millionth calculations with exactly the same accuracy and speed as the first one.

Versatility

Versatility is the ability to perform multiple tasks. Versatility is one of the most wonderful things about the computer. One moment, it is preparing the results of particular examination, the next moment it is busy in preparing electricity bills, and in between it may be providing some entertainment like music, video etc.

Power of Remembering

A computer can store and recall any amount of information because of its storage capability. Every piece of information can be retained as long as desired by the user and can be recalled as and

when required. Even after several years, the information recalled would be as accurate as on the day when it was fed to the computer.

No Feelings

Computers are emotionless. They have no feelings because they are machines. Any kind of weather or human feelings cannot effect on computer's working. It continues to work whatever the weather is or whatever the mood of computer operator is.

No I.Q.

Computer has no I.Q. It cannot do anything by itself. Computer can perform only those operations, which are instructed by its user. Computers cannot make any judgment by themselves. There judgment is based on the instructions given to them in the form of programs that are written by humans.

USES OF COMPUTER

1. Business
Almost every business uses computers nowadays. They can be employed to store and maintain accounts, personnel records, manage projects, track inventory, create presentations and reports. They enable communication with people both within and outside the business, using various technologies, including e-mail. They can be used to promote the business and enable direct interaction with customers.

2. Education
Computers can be used to give learners audio-visual packages, interactive exercises, and remote learning, including tutoring over the internet. They can be used to access educational information from intranet and internet sources, or via e-books. They can be used to maintain and monitor student performance, including through the use of online examinations, as well as to create projects and assignments.

3. Healthcare
Healthcare continues to be revolutionized by computers. As well as digitized medical information making it easier to store and access patient data, complex information can also be analyzed by software to aid discovery of diagnoses, as well as search for risks of diseases. Computers control lab equipment, heart rate monitors, and blood pressure monitors. They enable doctors to have greater access to information on the latest drugs, as well as the ability to share information on diseases with other medical specialists.

4. Retail and Trade
Computers can be used to buy and sell products online - this enables sellers to reach a wider market with low overheads, and buyers to compare prices, read reviews, and choose delivery preferences. They can be used for direct trading and advertising too, using sites such as eBay, Craigslist, or local listings on social media or independent websites.

5. Government
Various government departments use computers to improve the quality and efficiency of their services. Examples include city planning, law enforcement, traffic, and tourism. Computers can be used to store information, promote services, communicate internally and externally, as well as for routine administrative purposes.

6. Marketing

Computers enable marketing campaigns to be more precise through the analysis and manipulation of data. They facilitate the creation of websites and promotional materials. They can be used to generate social media campaigns. They enable direct communication with customers through email and online chat.

7. Science

Scientists were one of the first groups to adopt computers as a work tool. In science, computers can be used for research, sharing information with other specialists both locally and internationally, as well as collecting, categorizing, analyzing, and storing data. Computers also play a vital role in launching, controlling, and maintaining space craft, as well as operating other advanced technology.

8. Publishing

Computers can be used to design pretty much any type of publication. These might include newsletters, marketing materials, fashion magazines, novels, or newspapers. Computers are used in the publishing of both hard-copy and e-books. They are also used to market publications and track sales.

9. Arts and Entertainment

Computers are now used in virtually every branch of the arts, as well as in the wider entertainment industry. Computers can be used to create drawings, graphic designs, and paintings. They can be used to edit, copy, send, and print photographs. They can be used by writers to create and edit. They can be used to make, record, edit, play, and listen to music. They can be used to capture, edit and watch videos. They can be used for playing games.

10. Communication

Computers have made real-time communication over the internet easy, thanks to software and videoconferencing services such as Skype. Families can connect with audio and video, businesses can hold meetings between remote participants, and news organizations can interview people without the need for a film crew. Modern computers usually have microphones and webcams built-in nowadays to facilitate software like Skype. Older communications technologies such as email are also still used widely.

11. Banking and Finance

Most banking in advanced countries now takes place online. You can use computers to check your account balance, transfer money, or pay off credit cards. You can also use computer technology to access information on stock markets, trade stocks, and manage investments. Banks store customer account data, as well as detailed information on customer behavior which is used to streamline marketing.

12. Transport

Road vehicles, trains, planes, and boats are increasingly automated with computers being used to maintain safety and navigation systems, and increasingly to drive, fly, or steer. They can also highlight problems that require attention, such as low fuel levels, oil changes, or a failing mechanical part. Computers can be used to customize settings for individuals, for example, seat setup, air-conditioning temperatures.

13. Navigation

Navigation has become increasingly computerized, especially since computer technology has been combined with GPS technology. Computers combined with satellites mean that it's now easy to

pinpoint your exact location, know which way that you are moving on a map, and have a good idea of amenities and places of interest around you.

14. Working from Home

Computers have made working from home and other forms of remote working increasingly common. Workers can access necessary data, communicate, and share information without commuting to a traditional office. Managers are able to monitor workers' productivity remotely.

15. Military

Computers are used extensively by the military. They are use for training purposes. They are used for analyzing intelligence data. They are used to control smart technology, such as guided missiles and drones, as well as for tracking incoming missiles and destroying them. They work with other technologies such as satellites to provide geospatial information and analysis. They aid communications. They help tanks and planes to target enemy forces.

16. Social and Romance

Computers have opened up many ways of socializing that didn't previously exist. Social media enables people to chat in text or audio in real time across large distances, as well as exchange photographs, videos, and memes. Dating sites and apps help people to find romance. Online groups help people to connect with others who have similar interests. Blogs enable people to post a variety of views, updates, and experiences. Online forums enable discussions between people on specialist or general topics.

17. Booking Vacations

Computers can be used by travelers to study timetables, examine route options, and buy plane, train, or bus tickets. They can be used to explore and book accommodation, whether traditional hotels, or through newer services, such as Air BnB. Guided tours, excursions, events, and trips can also be explored and booked online using computers.

18. Security and Surveillance

Computers are increasingly being combined with other technologies to monitor people and goods. Computers combined with biometric passports make it harder for people to fraudulently enter a country or gain access to a passenger airplane. Face-recognition technology makes it easier to identify terrorists or criminals in public places. Driver plates can be auto-scanned by speed cameras or police cars. Private security systems have also become much more sophisticated with the introduction of computer technology and internet technology.

19. Weather Forecasting

The world's weather is complex and depends upon a multitude of factors that are constantly changing. It's impossible for human beings to monitor and process all the information coming in from satellite and other technologies, never mind perform the complex calculations that are needed to predict what is likely to happen in the future. Computers can process the large amounts of meteorological information.

20. Robotics

Robotics is an expanding area of technology which combines computers with science and engineering to produce machines that can either replace humans, or do specific jobs that humans are unable to do. One of the first use of robotics was in manufacturing to build cars. Since then, robots have been developed to explore areas where conditions are too harsh for humans, to help law enforcement, to help the military, and to assist healthcare professionals.

4.   Write a detail note on Generation of Computer.

COMPUTER GENERATION

Definition

Computer generation is a step in technology. Initially the term 'computer generation' was used to distinguish between hardware technologies but currently it has been extended to include both the hardware and software, which together make up an entire computer system.

FIRST COMPUTER GENERATION

Duration

The duration of the first generation was from 1942 to 1955.

Technology

In first generation 'Vacuum Tubes' were used. Vacuum tube was a fragile glass device that could control and amplify electronic signals.

Examples

ENIAC (Electronic Numerical Integrator and Calculator), EDVAC (Electronic Discrete Variable Automatic Computer), EDSAC (Electronic Delay Storage Automatic Calculator) etc.

Advantages

1. Vacuum tubes were the only electronic components available during those days.
2. Those computers were the fastest calculating device of their time.
3. They could perform computations in milliseconds.
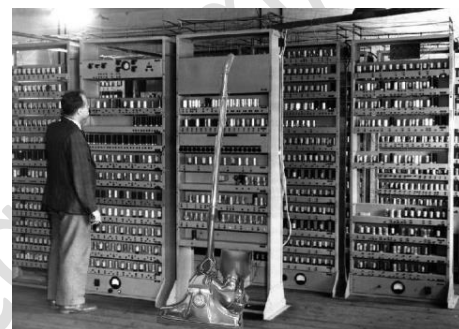
Disadvantages

1. Too bulky in size.
2. Unreliable.
3. Large amount of heat generated.
4. Heavy air-conditioning required.
5. Prone to frequent hardware failures.
6. Constant maintenance required.
7. Non -portable.
8. Commercial production was difficult and costly.

SECOND COMPUTER GENERATION

Duration

The duration of the second generation was from 1955 to 1964.

Technology

In second generation a small and more reliable device 'Transistor' was used. Many thousands of individual components had to be assembled by hand into functioning circuits. The manual assembly of individual components and the cost of labor involved at this assembly stage made the commercial production of these computers difficult and costly.

Examples: PDP-8, IBM 1401 and CDC 1604

Advantages

1. Smaller in size as compared to first generation computers
2. More reliable.
3. Less heat generated.
4. Computation time was reduced to microseconds.
5. Less prone to hardware failure
6. Better portability
7. Wider commercial use

Disadvantages

1. Air-conditioning was required.
2. Frequent hardware maintenance was required.
3. Manual assembly of individual components into functioning unit was required.
4. Commercial production was difficult.

THIRD COMPUTER GENERATION

Duration

The duration of the third generation was from 1964 to 1975.

Technology

In third generation, advancement in electronics technology made it possible to integrate large number of circuit elements into a very small surface of silicon known as 'chip'. This new technology was named as Integrated Circuit (IC). In third generation SSI (Small Scale Integration) was used.
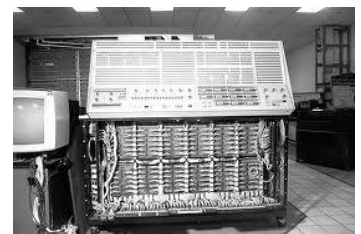
Example: IBM 360 and IBM 370 are the examples of third generation computers.

Advantages

1. Smaller in size as compared to previous generations
2. Less heat generated than second generation computers
3. Computation time was reduced to nanoseconds
4. Hardware failure was rare
5. Easily portable
6. General purpose computers

9

7. Less power requirement than previous generation computers

8. Commercial production was easier and cheaper

Disadvantages

1. Air-conditioning was required in many cases.

2. Highly sophisticated technology was required for the manufacture of IC chips.

FOURTH COMPUTER GENERATION

Duration

The duration of fourth generation started from 1975 and still going on.

Technology

With the advancement in manufacturing the IC (Integrated Circuit), it became possible to integrate hundreds of components on a single chip. This technology was known to be MS1 (Medium Scale Integration). Then came the era of LSI (large scale integration) and VLSI (Very Large Scale Integration). In VLSI more than one million components were integrated on a single chip.

Example: Pentium I, II, III, IV are the examples of fourth generation computers.

Advantages

1. Smallest in size because of high component density

2. Very reliable

3. Heat generated is negligible

4. No air conditioning required in most cases.

5. Much faster in computation than previous generation

6. Hardware failure is negligible and hence minimum maintenance is required.

7. Totally general purpose

8. Cheapest among all generations

Disadvantages

1. Highly sophisticated technology is required for the manufacture of VLSI chips.

FIFTH COMPUTER GENERATION (Yet to come)

Technology

Scientists aim to bring us machines with genuine I.Q., the ability to reason logically, and with real knowledge of the world. Thus unlike the last four generations which naturally followed their predecessor, the fifth generation will be totally different, totally new.

In structure it will be parallel and will be able to do multiple tasks simultaneously. In function, it will not be algorithmic (step by step, with one step at a time). In nature, it will not do just do data processing but knowledge processing. Japan has chosen the PROLOG (Programming in Logic)

language as its operating software and plans to have the final machine talk with human beings, see and deliver pictures and hear and understand the normal natural language.

5.   Von Neumann Architecture

Introduction:

➢ Von Neumann architecture was first published by John von Neumann in 1945.

➢ His computer architecture design consists of a Control Unit, Arithmetic and Logic Unit (ALU), Memory Unit, Registers and Inputs/Outputs.

➢ Von Neumann architecture is based on the stored-program computer concept, where instruction data and program data are stored in the same memory. This design is still used in most computers produced today.

Pictorial Representation:
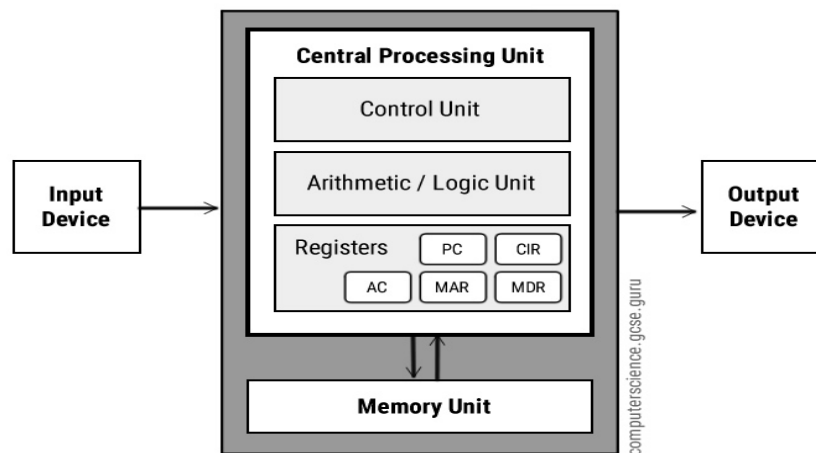
Central Processing Unit (CPU):

➢ The Central Processing Unit (CPU) is the electronic circuit responsible for executing the instructions of a computer program.

➢ It is sometimes referred to as the microprocessor or processor.

➢ The CPU contains the ALU, CU and a variety of registers

Registers:

➢ Registers are high speed storage areas in the CPU. All data must be stored in a register before it can be processed.

Some of the Important registers:

MAR	Memory Address Register	Holds the memory location of data that needs to be accessed
MDR	Memory Data Register	Holds data that is being transferred to or from memory
AC	Accumulator	Where intermediate arithmetic and logic results are stored
PC	Program Counter	Contains the address of the next instruction to be executed
CIR	Current Instruction Register	Contains the current instruction during processing

Arithmetic and Logic Unit (ALU):

➢ The ALU allows arithmetic (add, subtract etc) and logic (AND, OR, NOT etc) operations to be carried out.

Control Unit (CU):

➢ The control unit controls the operation of the computer's ALU, memory and input/output devices telling them how to respond to the program instructions it has just read and Execute from the memory unit. The control unit also provides the timing and control signals required by other computer components.

Buses:

➢ Buses are the means by which data is transmitted from one part of a computer to another connecting all major internal components to the CPU and memory.

A standard CPU system bus is comprised of a

➢ control bus
➢ data bus
➢ address bus

Address Bus	Carries the addresses of data (but not the data) between the processor and memory
Data Bus	Carries data between the processor, the memory unit and the input/output devices
Control Bus	Carries control signals/commands from the CPU (and status signals from other devices) in order to control and coordinate all the activities within the computer

Memory Unit:

➢ The memory unit consists of RAM sometimes referred to as primary or main memory. Unlike a hard drive (secondary memory); this memory is fast and also

directly accessible by the CPU.

➤ RAM is split into partitions. Each partition consists of an address and its contents (both in binary form)

➤ The address will uniquely identify every location in the memory.

➤ Loading data from permanent memory (hard drive), into the faster and directly accessible temporary memory (RAM), allows the CPU to operate much quicker.

6. What is main memory? Explain RAM and ROM in detail? OR How RAM interacts with CPU?

MEMORY

" A device or medium, which can accept data, hold data and deliver data on demand at a later time"

" Memory or computers storage is an electronic file that is used to place data until needed".

If we want to use any data or information again and again then we save the data or information at any important place or we memorized it. In computer, we store data and information in the memory for using the data or information again and again. When we give instruction to the computer, it goes to the memory of the computer and from the memory, CPU reads the instructions.

We can store hundred of files and documents in the memory unit of computer. The main difference between a human being and computer is that human being can forget memorized data while a computer remember the data, which we store in its memory.

TYPES OF COMPUTER MEMORY

Basically a Computer has two types of memory or storage devices:

- Primary Storage or Main memory
- Secondary Storage

Primary Storage or Main memory

The main memory of the computer is also called primary or volatile memory or primary storage or common storage. It stores instructions and data given to the computer for doing specific job. It also holds the final results produced by computer.

The main memory is located on the same board with the CPU. The control unit divides it into several areas. Each area of the memory is reserved for a specific function. The amount of memory reserved for each area is not specific. It varies according to the requirements of the program. This memory of computer is very limited and computer uses it temporarily. This built in memory allows the CPU to store and retrieve data very quickly. The rate of fetching data from this memory is typically of the order of 50 nanosecond / byte. Hence, the rate of data fetching from the main memory is about 100 times faster than that from a high speed secondary storage like disk. There are two main types of primary memory:

- RAM (Random Access Memory)

- ROM (Read Only Memory)

RAM (Random Access Memory)

RAM stands for Random Access Memory. It is temporary memory. In Random Access Memory data and information are not stored permanently.

When the computer is turned on, it uses Random Access Memory to write and read data and programs. When the computer is turned off, all programs and data are erased from the RAM. RAM is therefore, also called volatile memory. It is like a whiteboard on which information can be written, read, cleared and rewritten. We can read, write and delete information from RAM. The technology, which is nowadays used for RAM, is CMOS (Complementary Metal Oxide Semiconductor). This memory consists of small blank chips. Blank memory chips are fixed on a, single inline memory modules (SIMMs). Basically SIMM is a circuit board, which can hold a group of memory chips. Microprocessor fetches data from RAM and executes the instructions provided by the user of a computer. RAM is further divided into the following categories:

a) **DRAM (Dynamic RAM)**

DRAM stands for Dynamic Random Access Memory. Like a RAM chip, a DRAM chip stores data in the form of electric signals having ON/OFF states. It is a popular type of RAM and is mostly used in computers. DRAM is refreshed many times in a second that is way it is slow. During the refreshing process, the processor of the computer cannot read or write data in the DRAM. However it is cheaper, easily available and requires less power. The refreshing process of the DRAM decreases the processing speed of the computer. This type of memory was used in old microcomputers.

b) **SRAM (Static RAM)**

SRAM stands for Static Random Access Memory. The SRAM chip requires more power and compared to the DRAM. Static RAM is not popular but it is faster than DRAM because it does not have to refresh many times in a second. It is expensive and requires more space and power than DRAM. In large computers and also in microcomputers, the SRAM is used. The SRAM chip increases the processing speed of the computer. It is about 10 times faster than the DRAM.

ROM (Read Only Memory)

ROM stands for read only memory. ROM is used to store data and programs that are permanent or rarely changed. The information is generally put on a storage chip at the manufacturing stage and the contents of the ROM cannot be changed except under special circumstances. Therefore, a computer can read information stored in ROM but cannot write to it. Generally ROM is non-volatile

memory i.e. information stored in ROM is kept when power is removed from the computer. This memory contains BIOS (Basic Input Output of System). This memory is also called firmware because manufacturer of the computer produces this memory.

Computer uses ROM at the time of booting (start). At the time of booting computer reads from ROM what to do. ROM contains a set of start-up instructions that check to see that the rest of memory is functioning properly, check for hardware devices, and check for operating system on the computer's disk drivers.

ROM is further divided into the following categories:

a) PROM (Programmable ROM)

PROM stands for Programmable Read Only Memory. Manufacturer provides PROM chips and it is not possible for a customer to modify the programs stored inside the ROM chip. However it is possible for a user to change a system by converting own programs to micro programs and storing them in a PROM chip. However, once the chip has been programmed. The recorded information cannot be changed i.e. the PROM becomes a ROM. If there is any error in writing the instruction into a PROM, the error cannot be removed and the PROM becomes unusable.

b) EPROM (Erasable Programmable ROM)

EPROM stands for Erasable Programmable Read Only Memory. A memory chip in case of which it is possible to erase information stored in it, and the chip can be reprogrammed to store new information. If there is any error in writing the instruction or data into the EPROM, the user can erase the previous contents from the EPROM and can write new instructions. When an EPROM is in use, the instructions stored in EPROM can only be read and remain permanent in the chip unless erased.

c) EEPROM (Electrically Erasable Programmable ROM)

EEPROM stands for Electrically Erasable Programmable Read Only Memory. An EEPROM chip in which the stored information is erased by using high voltage electric pulses. It is also known as Flash Memory. In EEPROM a computer user can write instruction or data inside the EEPROM chip with special pulses. If there is any error in writing the instructions, the user can erase the contents electrically.

7. Introduction to algorithm

An algorithm is a set of steps of operations to solve a problem performing calculation, data processing, and automated reasoning tasks. An algorithm is an efficient method that can be expressed within finite amount of time and space.

An algorithm is the best way to represent the solution of a particular problem in a very simple and efficient way. If we have an algorithm for a specific problem, then we can implement it in any programming language, meaning that the algorithm is independent from any programming languages.

Algorithm Design

The important aspects of algorithm design include creating an efficient algorithm to solve a problem in an efficient way using minimum time and space.

To solve a problem, different approaches can be followed. Some of them can be efficient with respect to time consumption, whereas other approaches may be memory efficient. However, one has to keep in mind that both time consumption and memory usage cannot be optimized simultaneously. If we require an algorithm to run in lesser time, we have to invest in more memory and if we require an algorithm to run with lesser memory, we need to have more time.

Problem Development Steps

The following steps are involved in solving computational problems.

- ➢ Problem definition
- ➢ Development of a model
- ➢ Specification of an Algorithm
- ➢ Designing an Algorithm
- ➢ Checking the correctness of an Algorithm
- ➢ Analysis of an Algorithm
- ➢ Implementation of an Algorithm
- ➢ Program testing
- ➢ Documentation

Characteristics of Algorithms

The main characteristics of algorithms are as follows −

- ➢ Algorithms must have a unique name

- ➢ Algorithms should have explicitly defined set of inputs and outputs
- ➢ Algorithms are well-ordered with unambiguous operations
- ➢ Algorithms halt in a finite amount of time. Algorithms should not run for infinity, i.e., an algorithm must end at some point

Pseudo code:

Pseudo code gives a high-level description of an algorithm without the ambiguity associated with plain text but also without the need to know the syntax of a particular programming language.

The running time can be estimated in a more general manner by using Pseudo code to represent the algorithm as a set of fundamental operations which can then be counted.

Difference between Algorithm and Pseudo code

An algorithm is a formal definition with some specific characteristics that describes a process, which could be executed by a Turing-complete computer machine to perform a specific task. Generally, the word "algorithm" can be used to describe any high level task in computer science.

On the other hand, pseudo code is an informal and (often rudimentary) human readable description of an algorithm leaving many granular details of it. Writing a pseudo code has no restriction of styles and its only objective is to describe the high level steps of algorithm in a much realistic manner in natural language.

For example, following is an algorithm for Insertion Sort.

Algorithm: Insertion-Sort

```
Input: A list L of integers of length n
Output: A sorted list L1 containing those integers present in L
Step 1: Keep a sorted list L1 which starts off empty
Step 2: Perform Step 3 for each element in the original list L
Step 3: Insert it into the correct position in the sorted list L1.
Step 4: Return the sorted list
Step 5: Stop
```

Here is a pseudo code which describes how the high level abstract process mentioned above in the algorithm Insertion-Sort could be described in a more realistic way.

```
for i <- 1 to length(A)
   x <- A[i]
   j <- i
   while j > 0 and A[j-1] > x
      A[j] <- A[j-1]
      j <- j - 1
   A[j] <- x
```

8. What are Programming Languages? Explain different types of Computer Languages.

LANGUAGE

"Language is a way of communication".

Programming Language

- It is the way of communication between User and Computer.
- It is used to write computer programs.
- A computer program is a series of instructions that directs a computer to perform tasks.
- A computer programmer sometimes called a developer, creates or modifies computer programs.
- A programming language is a set of words, abbreviations and symbols that enables a programmer to communicate instructions to a computer.
- Just as human speak a variety of languages a programmer use a variety of languages and tools to create programs.
- Several programming languages exist today. Each language has its own rules for writing the instructions. A language provides the rules to write an instruction is called its syntax.
- Language is designed for specific purposes e.g. scientific applications, business solutions or Web Page Development.

Types of Programming Languages

There are two types of computer languages

1. Low Level Language
2. High Level Language

Low Level Language (LLL)

- The language, which is closed to machine, is called low-level language.
- A low level programming 4language is machine dependent. A machine dependent language runs on only one type of computer.
- These programs are not portable to other types of computer.
- Computer can easily understand low-level language.
- The low level language requires a deep understanding of the machine architecture.

There are two types of low level language

a) Machine language
b) Assembly language

Machine language

- It is the native language of computer. It is known as first generation programming language.
- The computer does not need any translator to understand it.
- Every machine language instruction consists of 0's and l's.
- It is difficult for human beings to understand and learn it.
- It is difficult to locate and remove errors in the program.
- It is directly executed by the computer.
- The machine language programs are machine dependent.

Assembly language

- Machine language instructions (0's and 1's) are replaced with English like words known as mnemonics (Ne-monics). It is second generation programming language.
- It is also called symbolic language.
- Symbolic instruction codes are meaningful abbreviations a programmer wants C for compare L for load M for multiply.
- An assembler is required to translate the assembly language programs into machine, language.

High level language

- It is closed to human language.
- It is user friendly language. User can learn and understand high level language easily:
- The instructions of HLL are written in English statements.
- The programs of HLL are not directly executed on the computer.
- The programs written in HLL are machine independent.
- A language translator is required to translate the HLL into low level language. Each language has its own translator. These translators are compilers and interpreters
- HLL programs are easy to modify, debug and more reliable.
- The HLL does not require a deep understanding of the machine architecture.
- HLL describes a well-defined way of writing programs.
- These languages are mostly used for writing application programs
- Every high level language provides a large number of built in functions.
- The programs in high level language are shorter than the programs in low level language. .
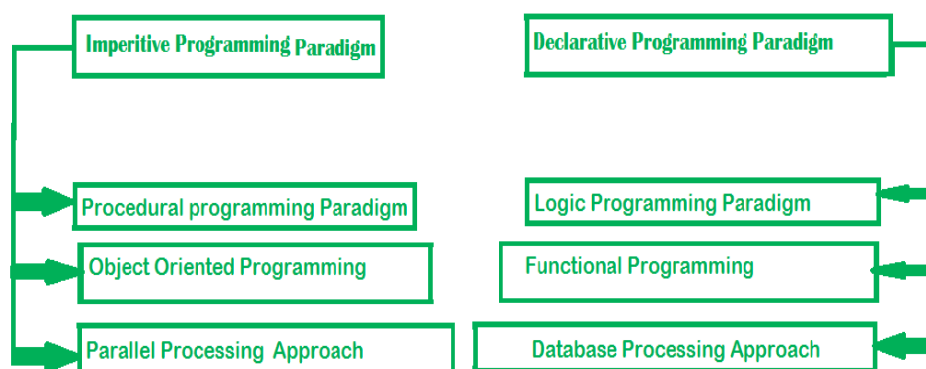
Examples:

- C and C++ (used for writing System Software)
- Java (Java is equipped with strong Network features)
- COBOL (common business oriented language and used for business applications)
- PASCAL
- FORTRAN (Formula Translation and used for mathematical problems)
- BASIC (Beginners all purposes symbolic instruction code)

9.   Introduction of Programming Paradigms

Paradigm can also be termed as method to solve some problem or do some task. Programming paradigm is an approach to solve problem using some programming language or also we can say it is a method to solve a problem using tools and techniques that are available to us following some approach. There are lots for programming language that are known but all of them need to follow some strategy when they are implemented and this methodology/strategy is paradigms. Apart from varieties of programming language there are lots of paradigms to fulfill each and every demand. They are discussed below:

Programming Paradigms

Imperitive Programming Paradigm	Declarative Programming Paradigm
Procedural programming Paradigm	Logic Programming Paradigm
Object Oriented Programming	Functional Programming
Parallel Processing Approach	Database Processing Approach

1.   Imperative programming paradigm:

It is one of the oldest programming paradigms. It features close relation to machine architecture. It is based on Von Neumann architecture. It works by changing the program state through assignment statements. It performs step by step task by changing state. The main focus is on how to achieve the goal. The paradigm consists of several statements and after execution of all the result is stored.

Advantage:

1. Very simple to implement
2. It contains loops, variables etc.

Disadvantage:

1. Complex problem cannot be solved
2. Less efficient and less productive
3. Parallel programming is not possible

Examples of Imperative programming paradigm:

```
C: developed by Dennis Ritchie and Ken Thompson
FORTRAN: developed by John Backus for IBM
Basic: developed by John G Kemeny and Thomas E Kurtz
```

Imperative programming is divided into three broad categories: Procedural, OOP and parallel processing. These paradigms are as follows:

1. **Procedural programming paradigm** –
   This paradigm emphasizes on procedure in terms of under lying machine model. There is no difference in between procedural and imperative approach. It has the ability to reuse the code and it was boon at that time when it was in use because of its reusability.

Examples of Procedural programming paradigm:

C: developed by Dennis Ritchie and Ken Thompson

C++: developed by Bjarne Stroustrup

Java: developed by James Gosling at Sun Microsystems

ColdFusion: developed by J J Allaire

Pascal: developed by Niklaus Wirth

2. **Object oriented programming** –
   The program is written as a collection of classes and object which are meant for communication. The smallest and basic entity is object and all kind of computation is performed on the objects only. More emphasis is on data rather procedure. It can handle almost all kind of real life problems which are today in scenario.

Advantages:

- Data security
- Inheritance
- Code reusability
- Flexible and abstraction is also present

Examples of Object Oriented programming paradigm:

Simulate: first OOP language

Java: developed by James Gosling at Sun Microsystems

C++: developed by Bjarne Stroustrup

Objective-C: designed by Brad Cox

Visual Basic .NET: developed by Microsoft

3. **Parallel processing approach** –
   Parallel processing is the processing of program instructions by dividing them among multiple processors. A parallel processing system posses many numbers of processor with the objective of running a program in less time by dividing them. This approach seems to be like divide and conquer. Examples are NESL (one of the oldest one) and C/C++ also supports because of some library function.

23

2. Declarative programming paradigm: It is divided as Logic, Functional, and Database. In computer science the *declarative programming* is a style of building programs that expresses logic of computation without talking about its control flow. It often considers programs as theories of some logic. It may simplify writing parallel programs. The focus is on what needs to be done rather how it should be done basically emphasizing on what code is actually doing. It just declares the result we want rather how it has be produced. This is the only difference between imperative (how to do) and declarative (what to do) programming paradigms. Getting into deeper we would see logic, functional and database.

1. **Logic programming paradigms –**

   It can be termed as abstract model of computation. It would solve logical problems like puzzles, series etc. In logic programming we have a knowledge base which we know before and along with the question and knowledge base which is given to machine, it produces result. In normal programming languages, such concept of knowledge base is not available but while using the concept of artificial intelligence, machine learning we have some models like Perception model which is using the same mechanism. In logical programming the main emphasize is on knowledge base and the problem. The execution of the program is very much like proof of mathematical statement, e.g., Prolog

2. **Functional programming paradigms –**

   The functional programming paradigm has its roots in mathematics and it is language independent. The key principal of this paradigm is the execution of series of mathematical functions. The central model for the abstraction is the functions which are meant for some specific computation and not the data structure. Data are loosely coupled to functions. The function hides their implementation. Function can be replaced with their values without changing the meaning of the program. Some of the languages like perl, javascript mostly uses this paradigm.

   ```
   Examples of Functional programming paradigm:
   JavaScript: developed by Brendan Eich
   Haskell: developed by Lennart Augustsson, Dave Barton
   Scala: developed by Martin Odersky
   Erlang: developed by Joe Armstrong, Robert Virding
   Lisp: developed by John Mccarthy
   ML: developed by Robin Milner
   Clojure: developed by Rich Hickey
   ```

   The next kind of approach is of Database.

3. **Database/Data driven programming approach –**

   This programming methodology is based on data and its movement. Program statements are defined by data rather than hard-coding a series of steps. A database program is the heart of a business information system and provides file creation, data entry, update, query and reporting functions. There are several programming languages that are developed mostly for database application. For example SQL. It is applied to streams of structured data, for filtering, transforming, aggregating (such as computing statistics), or calling other programs. So it has its own wide application.

```
CREATE DATABASE databaseAddress;
CREATE TABLE Addr (
    PersonID int,
    LastName varchar(200),
    FirstName varchar (200),
    Address varchar (200),
    City varchar (200),
    State varchar (200)
);
```

10. Introduction to Computers Graphics

What is Computer Graphics

Computer graphics is an art of drawing pictures on computer screens with the help of programming. In other words, we can say that computer graphics is a core tool for the generation and manipulation of images.

Types of Computer Graphics

There are two kinds of computer graphics

➢ Raster (composed of pixels)

➢ Vector (composed of paths)

Raster images are more commonly called bitmap images. A bitmap image uses a grid of individual pixels where each pixel can be a different color or shade. Bitmaps are composed of pixels

Application of Computer Graphics

➢ Computer Graphics has many applications, some of which are listed below:

➢ Computer graphics user interfaces (GUIs) A graphic, mouse-oriented paradigm which allows the user to interact with a computer.

➢ Business presentation graphics - "A picture is worth a thousand words".

➢ Cartography -Drawing maps.

➢ Weather Maps- Real-time mapping, symbolic representations.

➢ Satellite Imaging - Geodesic images.

➢ Photo Enhancement -Sharpening blurred photos.

➢ Medical imaging-MRIs, CAT scans, etc. - Non-invasive internal examination

➢ Engineering drawings - mechanical, electrical, civil, etc. - Replacing the blue prints of the past.

➢ Typography -The use of character images in publishing - replacing the hard type of the past.

➢ Architecture- Construction plans, exterior sketches - replacing the blue prints and hand drawings of the past

➢ Art - Computers provide a new medium for artists.

➢ Training   Flight simulators, computer aided instruction etc.

➢ Entertainment- Movies and games.

➢ Simulation and modeling- Replacing physical modeling and Attachments

Different Algorithms in Computer Graphics

Line Generation Algorithm

A line connects two points. It is a basic element in graphics. To draw a line, you need two points between which you can draw a line

DDA Algorithm

➢ Digital Differential Analyzer (DDA) algorithm is the simple line generation algorithm which is explained step by step here.

Step 1:

➢ Get the input of two end points (X0, Y0) and (X1, Y1)

Step 2:

➢ Calculate the difference between two end points

Bresenham's Line Generation

The Bresenham's algorithm is another incremental scan conversion algorithm. The big advantage of this algorithm is that, it uses only integer calculations

Mid-Point Algorithm

This Computer graphics Algorithm is used to find the slopes of the Two given Points to draw the hypotenuse of that point

Flood Fill Algorithm

Sometimes we come across an object where we want to fill the area and its boundary with different colors

Boundary Fill Algorithm

The boundary fill algorithm works as its name. This algorithm picks a point inside an object and starts to fill until it hits the boundary of the object

11. INTRODUCTION TO SOFTWARE ENGINEERING

The term software engineering is composed of two words, software and engineering.

Software is more than just a program code. A program is an executable code, which serves some computational purpose. Software is considered to be a collection of executable programming code, associated libraries and documentations. Software, when made for a specific requirement is called software product.

Engineering on the other hand, is all about developing products, using well-defined, scientific principles and methods.

So, we can define software engineering as an engineering branch associated with the development of software product using well-defined scientific principles, methods and procedures. The outcome of software engineering is an efficient and reliable software product.

IEEE defines software engineering as:

The application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software.

We can alternatively view it as a systematic collection of past experience. The experience is arranged in the form of methodologies and guidelines. A small program can be written without using software engineering principles. But if one wants to develop a large software product, then software engineering principles are absolutely necessary to achieve a good quality software cost effectively.

Without using software engineering principles it would be difficult to develop large programs. In industry it is usually needed to develop large programs to accommodate multiple functions. A problem with developing such large commercial programs is that the complexity and difficulty levels of the programs increase exponentially with their sizes. Software engineering helps to reduce this programming complexity. Software engineering principles use two important techniques to reduce problem complexity: abstraction and decomposition. The principle of abstraction implies that a problem can be simplified by omitting irrelevant details. In other words, the main purpose of abstraction is to consider only those aspects of the problem that are relevant for certain purpose and suppress other aspects that are not relevant for the given purpose. Once the simpler problem is solved, then the omitted details can be taken into consideration to solve the next lower level abstraction, and so on. Abstraction is a powerful way of reducing the complexity of the problem. The other approach to tackle problem complexity is decomposition. In this technique, a complex problem is divided into several smaller problems and then the smaller problems are solved one by one. However, in this technique any random decomposition of a problem into smaller parts will not help. The problem has to be decomposed such that each component of the decomposed problem can be solved independently

and then the solution of the different components can be combined to get the full solution. A good decomposition of a problem should minimize interactions among various components. If the different subcomponents are interrelated, then the different components cannot be solved separately and the desired reduction in complexity will not be realized.

NEED OF SOFTWARE ENGINEERING

The need of software engineering arises because of higher rate of change in user requirements and environment on which the software is working.

 Large software - It is easier to build a wall than to a house or building, likewise, as the size of software become large engineering has to step to give it a scientific process.

 Scalability- If the software process was not based on scientific and engineering concepts, it would be easier to re-create new software than to scale an existing one.

 Cost- As hardware industry has shown its skills and huge manufacturing has lower down the price of computer and electronic hardware. But the cost of software remains high if proper process is not adapted.

 Dynamic Nature- The always growing and adapting nature of software hugely depends upon the environment in which the user works. If the nature of software is always changing, new enhancements need to be done in the existing one. This is where software engineering plays a good role.

 Quality Management- Better process of software development provides better and quality software product.

CHARACTERESTICS OF GOOD SOFTWARE

A software product can be judged by what it offers and how well it can be used. This software must satisfy on the following grounds:

- ➢ Operational
- ➢ Transitional
- ➢ Maintenance

Well-engineered and crafted software is expected to have the following characteristics:

Operational

This tells us how well software works in operations. It can be measured on:

- ➢ Budget
- ➢ Usability
- ➢ Efficiency
- ➢ Correctness

- ➢ Functionality
- ➢ Dependability
- ➢ Security
- ➢ Safety

Transitional

This aspect is important when the software is moved from one platform to another:

- ➢ Portability
- ➢ Interoperability
- ➢ Reusability
- ➢ Adaptability

Maintenance

This aspect briefs about how well software has the capabilities to maintain itself in the ever-changing environment:

- ➢ Modularity
- ➢ Maintainability
- ➢ Flexibility
- ➢ Scalability

In short, Software engineering is a branch of computer science, which uses well-defined engineering concepts required to produce efficient, durable, scalable, in-budget and on-time software products.

12. Information and communications technology (ICT)

Information and communications technology (ICT) is an extensional term for information technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage, and audiovisual systems, that enable users to access, store, transmit, and manipulate information.

The term ICT is also used to refer to the convergence of audiovisual and telephone networks with computer networks through a single cabling or link system. There are large economic incentives to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution, and management. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliance with them such as video conferencing and distance learning. [Citation needed]

ICT is a broad subject and the concepts are evolving. It covers any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form (e.g., personal computers, digital television, email, or robots). For clarity, Zuppo provided an ICT hierarchy where all levels of the hierarchy "contain some degree of commonality in that they are related to technologies that facilitate the transfer of information and various types of electronically mediated communications". Theoretical differences between interpersonal-communication technologies and mass-communication technologies have been identified by the philosopher Piyush Mathur. Skills Framework for the Information Age is one of many models for describing and managing competencies for ICT professionals for the 21st century

13. What is Computer Software? Also explain the types of Computer Software?

COMPUTER SOFTWARE

"Programs that can be written by individual computer user or a group of computer experts to perform specific as well as general type of computer related jobs. These programs are known as Computer Software."

OR

"Any set of instructions that enable the computer to carry a particular task is known as Software."

TYPES OF SOFTWARE

There are two main types of software:

(1) System Software

 (2) Application Software

System Software

"The software that is essential and necessary in order to operate the computer system is called System Software.

OR

" Computer hardware that needs specially designed software to make it work. These are called System Software or Operating System."

A computer is useless machine if system software does not exist. It provides data and file manipulation. Computer hardware needs specially designed software to make it work. This software is called "System Software" or "Operating Systems"

System Software is a set of programs having following features:

- It provides an interface or link or bridge between a user and a computer.
- These software are designed to control the operations of computer system. (Not specific problems).
- These software are designed by manufacturer of the computer and by highly professional computer professionals.
- These software directly interact with hardware of the computer and indirectly with the user of the computer.
- It provides CPU management also called process management.
- It provides memory management.
- It enables a computer to boot (startup).

- It provides disk or storage management.
- It provides data and file manipulation.
- It provides sequence of commands to execute Application Software.
- It also provides networking and distribution facilities optionally.
- It manages all Input and Output Devices.

Examples
- Operating System Software
- Device Driver Software
- Programming Language Translator Software

Application Software

" A set of one or more programs design to solve the specific problem or do a specific task is called Application Software." For Example: pay calculation, processing of examination results, stores accounting and inventory control, etc.

Application software are often called the "Built-in" or " Readymade" packages. Application software performs some specific application required by the user by loading current program and data in RAM. The main categories of application software are:

a) Customized Software / Custom Built Software.

b) Package Software

(a) Customized Software / Custom Built Software

Customized Software / Custom built Software are the type of application software that is designed for the demand of particular customer. This type of software is designed to meet the exact requirements of a customer.

(b) Packaged Software

Packaged software is that type of application software that is designed for sale to the general customer. Customers purchase this type of application software according to his / her needs. Some important application software are as follows:

* Word Processing Software
* Spread Sheets
* Database
* Graphics Software
* Presentation Software
* Communication Software
* Animation Software

Word Processing Software

This software is the most popular software among computer user that is used to prepare reports, letters, application and other office documents. Using a word processor you may format your documents and apply character enhancement features like underline, italic, boldface, subscript or superscript style. **Examples:** Ms-Word, Notepad, Word Pad, Word Perfect etc.

Spread Sheets Software

It helps you to work with numbers. An electronic spreadsheet is a combination of rows and columns that is used to store or manipulate any kind numerical data. Different kind of formulas and functions may be applied to data. Spreadsheets are most commonly used for operating accounts and other financial reports. **Examples:** Ms-Excel, Lotus123 etc.

Database Software

These kinds of software let you to store and manage data in an efficient manner so that you may retrieve the required data according to your needs. This software allows you to computerize your every day's task. **Examples:** Ms-Access, FoxPro, SQL server, dbase, etc.

Graphics Software

This kind of software is used to prepare drawings and other artwork. It helps you to draw pictures and images. **Examples:** Paint, Adobe Photo Shop, Corel Draw etc.

Presentation Software

This application software is used to prepare different presentations and slides that are used to present your profile in electronic way. **Example:** Ms- PowerPoint.

Communication Software

It allows you to send / receive emails anywhere in the world any time. By using communication software you may not only transfer text and messages but also voice and images. **Examples:** Outlook Express, Ms-Outlook, Net meeting, etc.

Animation Software

By using this application software you may not only create different pictures but you may also animate them. With the enhancement of animation with images, computer world has altogether changed. **Examples:** Macromedia Flash, 3D-Studio Max etc.

14. What is Operating System? Also explain the Functions and Classification of Operating System?

OPERATING SYSTEM SOFTWARE

"An operating system is a special kind of software that behaves as an interface between user and computer. The software that enables communication between users and computer and controls all the internal functions of the computer is called Operating System."

OR

" A computer is digital electronic device. Hence to perform various operations and commands there is a need to have an organized set of instructions and commands that may control the overall operations of the computer, and can translate the user given commands into machine understandable form. This kind of software that provides a link between user and computer is known as Operating System."

As soon as, BIOS finishes its task of Booting, it automatically switches control to another special piece of software, which is usually placed on the computer's hard disk, floppy disk or CD. This most essential piece of software is called Operating System.

FUNCTIONS OF OPERATING SYSTEM

Operating system is a set of programs having following features:

1. It provides an interface or link or bridge between a user and a computer.
2. It manages and looks after the computer hardware resources and their operations.
3. If operating system is not loaded on to computer RAM, we cannot communicate with computer because there is no platform to communicate with computer.
4. Computer only understands machine language i.e. 1s and 0s. Operating system translates the user given instructions into computer language and converts computer given results in human readable form.
5. It provides CPU management also called process management.
6. It provides memory management.
7. It enables a computer to boot.
8. It provides disk or storage management.
9. It provides data and file manipulation.
10. It provides sequence of commands to execute application software.
11. It manages all Input and Output Devices.
12. It also provides networking and distribution facilities optionally.

The most commonly used operating systems are:

- o MS-DOS (Microsoft Operating System)
- o MS- WINDOWS (Microsoft Windows) (95, 98, 2000, XP, Vista etc)
- o UNIX and LINUX

CLASSIFICATION OF OPERATING SYSTEM:

The operating system can be classified as:

(1) Single-user operating system.

(2) Multi-user operating system.

(3) Single-tasking operating system.

(4) Multi-tasking operating.

(1) Single-user Operating System

Single-user operating system means only one user may log into the system at a time. These operating systems are used on individual computers. This kind of operating system is used only on personal computers. Usually where more than one- user don't log into the system. Some of the most widely used single-user operating systems are MS-DOS, OS/2, Macintosh OS, Windows 95 & 98.

(2) Multi-user Operating System

Multi-user operating systems means more than one user log into the computer at a time. These operating systems are usually used on computers, which are lying over LAN in an office and company. Multi-user operating systems are used on large computer systems for commercial, scientific and engineering data processing purposes. Some of the multi user operating systems are:
UNIX / XINAX, Novell, Windows NT.

(3) Single-tasking Operating System

The operating system on which just a single task can be performed at a time is called single tasking operating system. These operating systems are no longer popular now.

Example: MS-DOS

(4) Multi-tasking Operating System

The operating system on which multi tasks (operation) can be performed at a time is called multi tasking operating system. These operating systems have become extremely popular due to high accessibility options. **Examples:** UNIX, Windows, OS/2 etc

GUI Operating System

GUI stands for Graphical User Interface. Windows is a GUI operating system because it provides a visual environment with Command Buttons, Icons, Menus and different color combinations. Windows is easy to learn because its graphical interface is consistent from one application to another. People previously using DOS; they now prefer to use latest version of UNIX and windows, which are GUI operating system. However GUI systems usually have the disadvantage of requiring more

hardware such as CPU, more memory (RAM), higher quality monitors etc.

15. Compiler

Definition - What does Compiler mean?

A compiler is a software program that transforms high-level source code that is written by a developer in a high-level programming language into a low level object code (binary code) in machine language, which can be understood by the processor. The process of converting high-level programming into machine language is known as compilation.

The processor executes object code, which indicates when binary high and low signals are required in the arithmetic logic unit of the processor

A compiler executes four major steps:

Scanning: The scanner reads one character at a time from the source code and keeps track of which character is present in which line.

Lexical Analysis: The compiler converts the sequence of characters that appear in the source code into a series of strings of characters (known as tokens), which are associated by a specific rule by a program called a lexical analyzer. A symbol table is used by the lexical analyzer to store the words in the source code that correspond to the token generated.

> ➢ **Syntactic Analysis**

In this step, syntax analysis is performed, which involves preprocessing to determine whether the tokens created during lexical analysis are in proper order as per their usage. The correct order of a set of keywords, which can yield a desired result, is called syntax. The compiler has to check the source code to ensure syntactic accuracy

> ➢ **Semantic Analysis**

This step is comprised of several intermediate steps. First, the structure of tokens is checked, along with their order with respect to the grammar in a given language. The meaning of the token structure is interpreted by the parser and analyzer to finally generate an intermediate code, called object codeThe object code includes instructions that represent the processor action for a corresponding token when encountered in the program. Finally, the entire code is parsed and interpreted to check if any optimizations are possible. Once optimizations can be performed, the appropriate modified tokens are inserted in the object code to generate the final object code, which is saved inside a file.

What are the types of compilers?

Compiler is used as an interface between human understandable language and machine understandable language by transforming the former to the later.

Types of Compilers:

Native code compiler: The compiler used to compile a source code for same type of platform only. The output generated by this type of compiler can only be run on the same type of computer system and Os that the compiler itself runs on.

➢ Cross Compiler

The compiler used to compile a source code for different kinds platform. Used in making software's for embedded systems that can be used on multiple platforms.

➢ Source to Source Compiler

The compiler that takes high-level language code as input and outputs source code of another high-level language only. Unlike other compilers which convert high level language into low level machine language, it can take up a code written in Pascal and can transform it into C-conversion of one high level language into another high level language having same type of abstraction . Thus, it is also known as translator.

➢ One pass compiler

It is a type of compiler that compiles the whole process in only one-pass.

➢ Threaded code compiler

The compiler which simply replace a string by an appropriate binary code

➢ Incremental compiler: The compiler which compiles only the changed lines from the source code and updates the object code.

➢ Source compiler: The compiler which converts the source code high level language code in to assembly language only

There are the compilers known

➢ Ada compilers

➢ ALGOL compilers

➢ Basic Compilers

➢ Batch compilers

➢ C compilers

➢ Source-to-source compilers

➢ C++ compilers

16. Database management System

Definition

A database management system (DBMS) is system software for creating and managing databases. The DBMS provides users and programmers with a systematic way to create, retrieve, update and manage data

Classifications of Database

> **Memory database**

Is a database that primarily resides in main memory but is typically backed-up by non-volatile computer data storage. Main memory databases are faster than disk databases

> **Active Database**

Includes an event-driven architecture which can respond to conditions both inside and outside the database. Possible uses include security monitoring, alerting and authorization. Many databases provide active database features in the form of database triggers

> **Cloud Database**

Relies on cloud technology Both the database and most of its DBMS reside in the cloud while its applications are both developed by programmers and later maintained and used by end-users through a web browser and Open APIs

> **Deductive Database**

Deductive database combines logic programming with a relational database

> **Distributed Database**

Distributed database is one in which both the data and the DBMS connect multiple computers

> **Embedded Database**

Embedded database system is a DBMS which is tightly integrated with an application software that requires access to stored data in such a way that the DBMS is hidden from the application's end-users

> **Graph Database**

A graph database is a kind of NoSQL database that uses graph structures with nodes, edges, and properties to represent and store information

> ➤ **Array Database**

An array DBMS is a kind of NoSQL DBMS that allows modeling, storage, and retrieval of (usually large) multi-dimensional arrays such as satellite images and climate simulation output.

Relational Database

A relational DBMS stores information in a set of "tables", each of which has a unique identifier or "Primary key". The tables are then related to one another using "foreign keys"

What is primary key

A primary key, also called a primary keyword, is a key in a relational database that is unique for each record. It is a unique identifier, such as a driver license number, telephone number

Foreign Key

A foreign key is a column or group of columns in a relational database table that provides a link between data in two tables. It acts as a cross-reference between tables

<div align="center">

Important terms to know about Database

</div>

> ➤ Field:

Each piece of data is stored in its own location called "field"

> ➤ Record:

Data is stored in records. A record is composed of fields and contains all the data about one particular person, company

> ➤ Tuple:

A single row of a table, which contains a single record for that relation is called a tuple

> ➤ Table:

In relational databases a table is a set of data elements (values) using a model of vertical columns and horizontal rows.

17.   WWW

Definition

"The World Wide Web is the universe of network accessible information an Expression representation of human knowledge."

Introduction

Abbreviation = WWW Stands for "World Wide Web "

The World Wide Web, or just "the Web," as ordinary people call it, is a subset of the Internet. The Web consists of pages that can be accessed using a Web Browser. the Internet is the actual network of networks where all the information resides. Things like Telnet, FTP, Internet gaming and e-mail are all part of the Internet, but are not part of the World Wide Web. The Hyper-Text Transfer Protocol (HTTP) is the method used to transfer Web pages to your computer. With hypertext, a word or phrase can contain a link to another Web site. All Web pages are written in the hyper-text markup language (HTML), which works in conjunction with HTTP.

Types of Web

- ➢ Surface WEB
- ➢ Deep WEB
- ➢ Dark WEB

Important Abbreviation

http	hyper text transfer protocol
Https	hyper text transfer protocol Secure
URL	Uniform Resource Locator
IP	Internet protocol
FTP	File Transfer Protocol
SMTP	Simple Mail Transfer Protocol

18. What is Artificial intelligence

Introduction

Any developed program that can behave intelligently is called AI

or

The branch of CS that is concerned with the automation of intelligent

Artificial Intelligence Sub-domains

1) NLP (Natural Language Processing)

2) Automatic Reasoning

3) Knowledge Representation (capable to store information/memories)

4) Machine Learning (System should be capable to adapt new environment)

5) Computer Vision (to perceive objects)

6) Robotics (to manipulate/move objects)

The Foundations of Artificial Intelligence:

1) Philosophy

2) Mathematics

3) Economic

4) Neuroscience

5) Psychology

6) Computer Engineering

7) Control Theory

What is Artificial intelligence?

John McCarthy, who coined the term Artificial Intelligence in 1956, defines it as "the science and engineering of making intelligent machines", especially intelligent computer programs.

Another Definition of AI

The automation of activities that we associate with human thinking, activities such as decision-making, problem solving

Intelligence

> Relate to tasks involving higher mental processes. Examples:

> creativity, solving problems, pattern recognition, classification, learning, induction, deduction, building analogies, optimization, language processing, knowledge and many more.

Intelligent Behavior

> Perceiving one's environment,

- Acting in complex environments,
- Learning and understanding from experience,
- Reasoning to solve problems and discover hidden knowledge,
- Knowledge applying successfully in new situations,
- Thinking abstractly, using analogies,
- Communicating with others, and more like
- Creativityaggressive-ness

Goals of AI

The definitions of AI give four possible goals to pursue:

1. Systems that think like humans.

2. Systems that think rationally.

3. Systems that act like humans

4. Systems that act rationally

What is an Expert System?

A computer program designed to model the problem solving ability of a human expert

The Benefits of Expert Systems

The benefits of expert systems (ES) can be listed as follows:

- Increased output and productivity: As compared with humans, ES can work faster than humans, requiring fewer workers and reducing cost.
- Increased quality: ES can increase quality by providing consistent advice and reducing error rate.
- Flexibility: In providing services and in manufacturing
- Easier equipment operation
- Operation in hazardous environments
- Accessibility to knowledge: ES make knowledge and information accessible to people.
- Reliability: ES are reliable in that they do not become tired or bored, and they consistently pay attention to all details

AI trends in various sectors

- Healthcare
- Entertainment
- Finance
- Data security
- Manufacturing
- Automotive industry
- Email filtering
- Personalization
- Fraud detection
- Speech recognition
- Finger print scanner
- Face Recognition
- Voice Recognition
- Courier drones (Drop packages over the desired Destination)
- Robotics (for aerobatics purpose)
- Solar panel Air plane (providing net beams)

19. Virus and Anti Virus

What is VIRUS? (Vital information Resources under Siege)

A virus is a computer code or program, which is capable of affecting your computer data badly by corrupting or destroying them

Introduction

Computer virus has the tendency to make its duplicate copies within your computer and also spread it across every folder and damage the data of your computer system

A computer virus is actually a bad software program or "malware" it is infecting your system, replicates itself by modifying into the Computer Files and Computer Sub folders e.g

Automatically created Shortcut Folders in your PC

Types of Viruses

Following are the major types of computer virus

> **Worms:**

This is a computer program that replicates itself at a swift pace. Unlike a computer virus, it is self-contained and hence does not need to be part of another program to propagate itself.

> **Trojan Horse:**

A Trojan Horse is also a sort of destructive program that remains change in behavior with a normal software program. It is not exactly a virus, as it cannot replicate itself. However, there is possibility that virus program may remain concealed in the Trojan Horse

> **Bombs:**

It is similar to Trojan Horse, but Logic bombs have some specialty these include a timing device and hence it will go off only at a particular date and time

How Does Virus Affect?

Let us discuss in what ways a virus can affect your computer system. The ways are mentioned below

> By downloading files from the Internet.
> During the removable of media or drives.
> Through pen drive.
> Through e-mail attachments.
> Through unpatched software & services.
> Through unprotected or poor administrator passwords

Impact of Virus

Let us now see the impact of virus on your computer system

- ➢ Destroy the normal functionality of respective computer system.

- ➢ Destroy system network use.

- ➢ Destroy data.

- ➢ Destroy computer network resources.

- ➢ Destruction of confidential data

Virus Detection

The most fundamental method of detection of virus is to check the functionality of your computer system a virus affected computer does not take command properly

However, if there is antivirus software in your computer system, then it can easily check programs and files on a system for virus signatures

Virus Preventive Measures

Let us now see the different virus preventive measures. A computer system can be protected from virus through the following

- ➢ Installation of effective antivirus software.

- ➢ Patching up the operating system.

- ➢ Patching up the client software.

- ➢ Putting highly secured Passwords.

- ➢ Use of Firewalls

Most Effective Antivirus

Following are the most popular and effective antivirus from which you can choose one for your personal computer

- ➢ McAfee Antivirus Plus

- ➢ Symantec Norton Antivirus

- ➢ Avast Pro Antivirus

- ➢ Bitdefender Antivirus Plus

- ➢ Kaspersky Anti-Virus

- ➢ Avira Antivirus

- ➢ Webroot Secure Anywhere Antivirus

- ➢ Emsisoft Anti-Malware

- ➢ Quick Heal Antivirus

- ➢ ESET NOD32 Antivirus

20. Write a note on features of MS-Word?

MICROSOFT WORD

Microsoft Word is a word processing application package. This provides us the facilities to apply different formatting techniques & styles to our document. It is most widely used word processing package now a days. By using MS Word we can create any kind of letters, office memos, C.Vs etc.

IMPORTANT FEATURES OF MICROSOFT WORD

Built in Templates

Built-in and custom templates allow fast document creation based on text and styles, AutoText, macros, toolbars stored with individual template.

Moving and Copying Text

We can move or copy some text from one document to other or in the same document.

Find and Replace

With the Find and Replace feature, we can locate a word or phrase and replace it with another piece of text.

Headers and Footers

We can write some text in the header or footer of the document.

Current Date & Time

We can insert current date or time in document.

Large Document Management

It provides the facility to manage large document like the ability to easily create tables of contents, indexes, tables of authorities etc.

Page Number

MS Word provides us the facility to number the pages.

Symbol

We can include different types of symbols in our document.

Graphics

We can include different pictures, images in our document.

Fonts, Styles, Size

We can apply different types of font's styles, size as needed in our document.

Bullets and Numbering

Microsoft Word provides us the facility to format lists with bullets and numbers.

Labels and Envelopes

We can create our labels and envelopes using Words built-in features.

Spelling, Grammar and Thesaurus

MS Word has power full feature of spell check and has huge dictionary.

Tables

We can draw tables in our document as needed.

Toolbars

Toolbars are also available on top of software window, providing quick access to the buttons, frequently used.

Sort

We can customize our workspace by editing and creating new toolbars. Sort allows us to sort simple text and perform complex sorts on lists and records created with the merge feature.

Merge

We can create form letters for mass mailings.

Macros

We can use the macros to automate tasks that are performed often.

Indents

Indents are the positions where text begins and ends on a line relative to the page margins. Indenting is a way of offsetting text from the rest of the text, creating different indents for the first line, subsequent lines or all lines in the selected paragraph(s).

Setting Page Margins

The white space around text on the printed page is the margin area. You can change the top, bottom, left and right margins. You can set margins in two different ways: by dragging margin markers on the Ruler bar, or by setting margins in the Page Setup dialogue box.

Printing

Word allows you to print in several different ways from the keyboard, toolbar, or the menu. Often the whole document will be printed, but it is possible to print only a single page or only selected text. Alternatively you may want to print several documents at once, or several copies of the same document.

Task Pane

A task pane (also called task panel) provides easy access to various commands that you might want to access from this folder. E.g. it can be used to display the formatting properties of selected text, open an existing document etc.

21. What is MS PowerPoint? Explain its important features.

MICROSOFT POWER POINT

PowerPoint is a presentation program developed by Microsoft. It is included in the standard Office suite along with Microsoft Word and Excel. The software allows users to create basic slide shows to complex presentations.

Power Point is often used to create business presentations, and can also be used for educational or informal purposes. The presentations are comprised of slides, which may contain text images, and other media, such as audio clips and movies. Sound effects and animated transitions can also be included to add extra appeal to the presentation.

FEATURES OF MICROSOFT POWERPOINT

Tips and Advice

The Assistant helps you to create better presentations by providing tips and advice based on the task at hand. When you start certain tasks, a light bulb will appear on the screen. Click the light bulb to see the tip.

AutoFit Text

If you have a few extra lines of text that do not fit in a text placeholder, Microsoft PowerPoint automatically resizes the text to fit.

New Normal View

The new normal view simultaneously displays the slide, outline, and notes views in their own adjustable panes, so you can see everything at once.

Native Table Tools

New native table tools let you create and format tables within PowerPoint. Use the Draw Table tool much the same way you use a pen to draw a table — just click and drag to draw the table boundaries and cell partitions.

Graphical Bullets

New graphical bullets add extra flair to your slides. They can be used to replace the standard font-based bullets. A large selection of bullets is included, and you can import your own custom-made bullets as well.

Numbered Lists

Numbered lists are now supported in PowerPoint. When you change the order of items in a numbered list, PowerPoint automatically renumber the list for you.

Handout Options

Your handout options have been expanded. Now you can print two, three, four, six, or nine slides on a page in either horizontal or vertical orientation.

Better Voice Narration

Narrations can now be recorded and edited one slide at a time, giving you greater flexibility when preparing your soundtrack.

New Design and Content Templates

A wide variety of new designs are available for you to apply to your slides including a number of animated templates with preset animation.

New Clip Gallery

The new Clip Gallery can store pictures, sounds and movies. If we use a picture, sound. Or movie often, you can add it to the Clip Gallery for easy access

Graphics and Objects

PowerPoint makes using graphics on Web pages easy. Graphics for Web pages are automatically stored in GIF, JPEG and PNG format. Even after you save your presentation as a Web page, you can still edit graphics and objects when you open your Web page in PowerPoint

Scanner Support

You can scan a picture directly into PowerPoint from most TWAIN-compatible scanners and digital cameras.

Animated GIF Pictures

PowerPoint supports the playing of animated GIF pictures to add motion to your presentations

Projector Wizard

The Projector Wizard automatically sets and restores the correct screen resolution for the projection system that you are using. Most popular projection systems are supported.

Improved Laptop Support

New laptop support disables any screen saver or power-saving mode while you are giving a presentation, preventing unwanted interruptions.

Presentation Broadcasting

With presentation broadcasting we can schedule and give a slide show over the Web, complete with audio and video. Broadcast presentations can be saved on a Web site for future playback.

Schedule and Conduct an Online Meeting

We can schedule a meeting directly from Microsoft PowerPoint. Participants can make changes to the presentation, see changes made by others, and exchange information, all in real time.

Automatic File and Link Management

PowerPoint automatically manages companion files, such as graphics. When you create a Web page, all supporting files are stored in a file folder with the same name as the main .html file. When

you save your presentation to a new location, PowerPoint checks the links and repairs those that aren't working.

Web Server Access

Use the Web Folders feature to manage your files stored on a Web server. You can access Web Folders through Windows Explorer, or through any Office program. Use Web Folders to create folders, view properties. And drag files to any Web server that you have permissions to.

Anti-Virus Support

Developers can easily add virus checkers to Microsoft PowerPoint by using the programming interface. PowerPoint also has virus-checking tools incorporated into the programs Use Multiple Languages

You can enter, display, and edit text in all supported languages in any language version of Microsoft PowerPoint. Supported languages include European languages, Japanese, Chinese, Korean, Hebrew, and Arabic.

22. What is Microsoft Excel? Why we use MS-Excel? Write down its important feature?

MS-EXCEL

Microsoft Excel is spreadsheet application software. This software is developed by Microsoft Corporation and is provided in Microsoft Office application suite. Microsoft Excel application is used to manipulate the numeric data of any small or big organization. You can create small database with its help. Although you can use Excel to organize and sort non-numeric information, the primary goal for Excel is to help you organize and manage financial information such as income statements, balance sheet, and forecasts. Excel is an electronic work sheet program. Microsoft Excel is one of the best spread sheet programs in the world.

WHY WE USE MS-EXCEL?

Microsoft Excel is software used to organize data and save time performing repetitive calculations. However, Excel does come with a learning curve that you have to overcome before you can fully appreciate what it can do for your home or business. Excel cells are like many calculators arranged in a grid. Each cell is capable of making mathematical calculations. The calculation can be one such as 1+3 or a calculation using values in other cells in the spreadsheet.

FEATURES OF MS-EXCEL

There are number of reasons, due to which this is the first choice in office works.

The main features and benefits of MS-Excel are as follow:

Speech Recognition

You can dictate text directly into a file using speech recognition, or you can format text using voice commands.

Handwriting Recognition

Handwriting recognition allows you to enter handwritten text into typed characters.

Ask a Question Box

You can get immediate online help by typing you help question directly into the Ask a Question Box.

Smart Tags

The smart tag feature allows you to access contextual (related) information directly from your file. A small tag typically appears embedded in your file after you complete a task such as pasting

data.

Images and Animations

Every user can access clips online and chose among thousands of images and animations available for download over the web.

Document Recovery

The document recovery feature ensures that you don't have to worry about losing your documents. If your computer should crash or a program error should occur while working with MS-Excel, the document recovery feature allows you to save and recover your current files.

Control Numerical Data

MS-Excel is used to control numerical data like accounts, financial reports, statistical facts, ledger and simple trial balance.

Storing Information of Inventory and Stock

Excel is also used to store the information of inventory control and stock control.

Preparation of Invoices

Invoices/bills can also be prepared using Excel automatically.

Built in Formulas and Functions

It provides us big range of arithmetic formulas and functions to manipulate data. It can automatically add, multiply, divide and subtract values.

Presentation of Data in Graphs and Charts

It can also present data in shape of graphs and charts. User can present the statistics in graphical form with the help of chart option.

Formatting Facility

A wide range of formatting is available for numbers, alignments, fonts, borders and shading etc.

Spelling and Grammar Check Facility

Spelling and Grammar option is available to avoid spelling and grammatical mistakes.

Wide Range Functional Sheets Facility

It provides us with wide range of functional sheets and cells. Sheets of MS-Excel are composed of thousands of rows and hundreds of columns.

Undo and Redo

Excel provides a facility of Undo and Redo.

Header and Footer

Excel also provides a facility of header and footer.

Protection

You can protect your data from unauthorized user by using password facility in protection

feature of Excel.

Save as Web Page

We can also save excel sheet from internet by using Save as Web Page option.

Filter

You can filter and display your required data by using filter feature of excel.

Auto Shapes

Auto shapes tool bar allows you to draw many different geometrical shapes, arrows, flow charts.

Recalculation

Excel also provides us the facility of recalculation.

Auto Fill

Auto fill is the feature of Excel that allows you to automatically fill cell with a series of numbers, dates etc.

Data Analysis Options

A wide range of data analysis options is available to facilitate the users in different calculations and report making tasks.

Compatible

Excel's spreadsheet is compatible with all other office suit.

Import and Export Facility

It facilitates user to import and exports the information to and from different software as well as Internet.

Custom Format Styles

User can make their custom format styles instead of using the built in styles.

Toolbars

Toolbars shortcuts are available to make editing and formatting easier in MS-Excel.

The Formula Bar

MS-Excel allows you to keep track of cell addresses and to enter formulas for performing calculations.

E-Mail Worksheets

We can E-Mail work sheet to many persons directly from Excel.

23. What is Input? What are Input Devices? Explain the input devices in detail.

INPUT

Definition

"Anything enters in to the computer system is called input".

The input is in the form of instructions given by the user with the help of any input device

INPUT DEVICES

Definition

"The devices that are used to enter data and instructions into the computer system are called input devices."

Computer can only understand binary code that's why these input devices takes data or instructions, convert them into the binary code and then store them into the main memory.

Some of the mainly used input devices are:

KEYBOARD

Keyboard is the most widely used input device. It is used to enter data and program instructions into the computer. Now a days keyboard has more than 100 keys. Some types of keys are follows:

Alphabets: A — Z and a — z keys;

Numeric: 0 — 9 keys are present at two places on keyboard.

MathematicalSymbo1: +-*/%&.

Punctuation Characters: . ,:; '"etc.

Cursor Movement Key: Four arrow keys are used to move the cursor on the screen.

Editing Function Keys: ENTER, RETURN, ESC, CTRL, ALT. CTRL & ALT are used in combination with other keys of keyboard to perform special functions.

Function Keys: Fl — F12 keys are used to perform different functions.

Special Purpose Keys: Home, End, Page Up, Page Down, Delete, Insert etc.

MOUSE

Mouse is also an important input device. It is used for controlling screen cursor.

Construction

It has two or three buttons on its top and a rubber or metal ball inside its body.

Working

The ball rotates as the mouse is rolled over a flat surface. Normally, a pad is used as a flat surface. As the mouse is rolled over a flat surface or a mouse pad, the

mouse cursor or pointer moves on the screen. Mouse is normally used in graphic applications. It is also used to play games on the computer. Today optical mouse are also available which use laser technology instead of sensor system.

DIGITAL SCANNER

Digital scanner is an input device. It is also called optical reader or simply scanner. It scans or reads text and pictures printed on a paper and enter them directly into the computer memory.

Working

The scanner takes electronic images of text or pictures from the paper. It breaks each image into light and dark dots and stores them into the computer memory in machine codes.

Advantage

The advantage of a scanner is that the input data need not be typed in by the user. This is fast and accurate method for entering data into the computer.

DIGITAL CAMERA

Digital camera is also used as an input device. It is used to input pictures directly into the computer.

Construction

Like traditional cameras, digital cameras have a lens, a shutter and an optical view-finder.

Working

In digital cameras, image falls on a charge-coupled device (CCD). A photosensitive computer chip transforms light patterns into dots. A high quality digital camera divides a picture into millions of dots. After the image has been captured, it is saved into a camera's memory card then to the computer memory.

Advantage

The big advantage of digital cameras is that making photos is inexpensive and fast because there is no film processing. Interestingly, one of the biggest boosters of digital photography is Kodak, the largest producer of film. Kodak developed the Kodak Photo CD format, which has become the de facto standard for storing digital photograph.

LIGHT PEN

It is an input device which is used to give input to the computer directly through the screen.

Construction
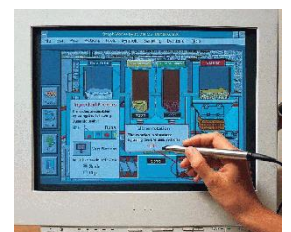
It is pen-shaped input device which is held in hand and can detect the presence or absence of light with help of photo-electric cell mounted at its front end. Its other end is connected to a computer terminal by means of a cable.

Working

When it is brought near the screen, the light emitted is scanned by the photo cell and then it sends electrical signals to computer.

JOYSTICK

This is an input device, which allows a user to control the movement of objects on the screen with the help of a small lever in any direction. It is also provided with some buttons, which are used to carry out different

Advantage

A joystick is similar to mouse but it allows faster movements required in games whereas the mouse is mostly used in office environment for windows and other computer programs. With a joystick, the pointer continues moving in the direction the joystick is pointing. To stop the pointer, you must return the joystick to its upright position.

TRACKBALL

It is a pointing device. Essentially, a trackball is a mouse lying on its back. To move the pointer, you rotate the ball with your thumb, your fingers, or the palm of your hand. There are usually one to three buttons next to the ball, which you use just like mouse buttons.

Advantage

The advantage of trackballs over mice is that the trackball is stationary so it does not require much space to use it. In addition, you can place a trackball on any type of surface, including your lap. For both these reasons, trackballs are popular pointing devices for portable computers.

TOUCH PAD

A small, touch-sensitive pad used as a pointing device on some portable computers. By moving a finger or other object along the pad, you can move the pointer on the display screen. And you can click by tapping the pad or buttons available close to touch pad.

MICROPHONE

It is used to enter voice into the computer system. The sound waves are converted into digital form and then enter into the computer system for further processing.

24. What is Output? What are Output Devices? Explain the Output devices in detail.

OUTPUT

Definition

"The information or results, we receive from computer system are called output".

OUTPUT DEVICES

Definition

"The devices that are used to receive information from computer and give it to user are called output devices".

Input devices are used to receive data from user while output devices receive information from computer and give it to user. A computer cannot be complete without an output device.

Some of the mainly used output devices are:

MONITOR

The monitor or Visual Display Unit (VDU) is the most commonly used output device. It is like a TV screen. It can display alphanumeric characters, special characters and graphics. The output provided by monitor is called 'soft copy'.

Types of Monitor

- **CRT Monitors**

It is like a TV screen. The monitor contains a large Vacuum tube called Cathode Ray Tube (CRT). Due to CRT, they are also called CRT monitor. A CRT consists of three Electron Guns' of three colors Red, Green, and Blue. Every picture is formed with combination of these three colors. The back of screen is coated with Phosphors, which glow when rays from guns strike the screen. In this way, a bright and colorful image is displayed. Such monitors are also called ROB monitors.

- **LCD Monitors**

LCD stands for Liquid Crystal Display. A monitor that uses LCD technologies rather than the conventional CRT technologies is called LCD monitor. Until recently, LCD panels were used exclusively on notebook computers and other portable devices. However in 1997, several manufacturers began offering full-size LCD monitors as alternatives to CRT monitors. Currently, however, they are more expensive than CRT monitors.

Advantage

The main advantage of LCD monitors is that they take up less desk space and are lighter in weight and require less electric power to operate.

PRINTER

Printers are used to produce output in the form of text and graphics on paper. The output on a paper is called 'hardcopy'. Printers are the most commonly used output devices for making hardcopies of the output.

Different printers have different printing mechanism. Depending upon their printing technique, printers are classified into two groups:

- **Impact Printers**

Impact printers print on the paper with the strikes of hammer or pins on a ribbon. These printers work like a typewriter. They are mostly used with personal computers. e.g. Dot Matrix Printers.

o **Dot Matrix Printers**

Dot matrix printer is an impact printer. It makes a hardcopy by printing one character at a time. It uses 100 to 300 dots per inch (DPI) to print output on the paper. Dot matrix printers are also used to create character shape of alphabets of other languages such as Urdu, Arabic, Chinese and Hindi etc. They are less expensive printers.

Working

The output from the CPU in digital signals makes the pins pressed forward by a magnetic device and the required character is printed.

Speed

The printing speed of dot matrix varies from 200 to 1000 or more characters per minute.

- **Non-Impact Printers**

Non-Impact printers use thermal, electrostatic, laser and inkjet technologies for printing. These printers are faster and produce high quality output as compared to the impact printers. e.g. Laser Printers, Inkjet Printers etc.

o **Laser Printers**

Laser stands for Light Amplification by Stimulated Emission of Radiation. Laser printer is a non-impact printer. It uses 300 to 2000 dots per inch (DPI). Laser printer print one page at a time that's why these are also called page printers. Laser printer produces a very high quality text and graphics.

Working

In these printers, a full page is assembled in the printer buffer and a laser beam prints image of characters and pictures on the paper.

Speed

They have very printing speed. The printing speed of these printers ranges from 5 to 300 pages per minute.

o **Inkjet Printers**

Inkjet printer is a non-impact printer. It is a character printer its print quality is higher than that of the dot matrix printer.

Working

It creates output on paper by a spray of ink from a fine jet. An electric field controls the spraying jet that forms characters or graphs on the paper.

Speed

It is a character printer and produces one character at a time. The printing speed of these printers varies from 1 page to 8 pages per minute.

SPEAKER

To hear voice from computer we can attach speaker with the computer as an output device.

25. Define Computer networks. What are different types of Computer Networks?

COMPUTER NETWORK

Computer network is a system in which, a large number of computers interconnected together to communicate with each other via a communication medium".

OR

"Two or more computers connected together through a communication medium to share resources is called computer network".

Purpose

The main purpose of any computer network is resource sharing. The computers connected in a network can share data and information stored on any computer. Other resources e.g. hard disk, CD ROM etc. can also shared.

Advantages of Computer Network

- Data and information can be shared among different users of a network.
- Resources like printer, CD drive, Hard disk and software can be share.
- By sharing resources we can save large amount of money.
- Expensive and costly software can also be shared via networking.
- Internet is also example of a network. We can contact anybody in the world.
- We can send messages to different users of the network speedily without any cost.
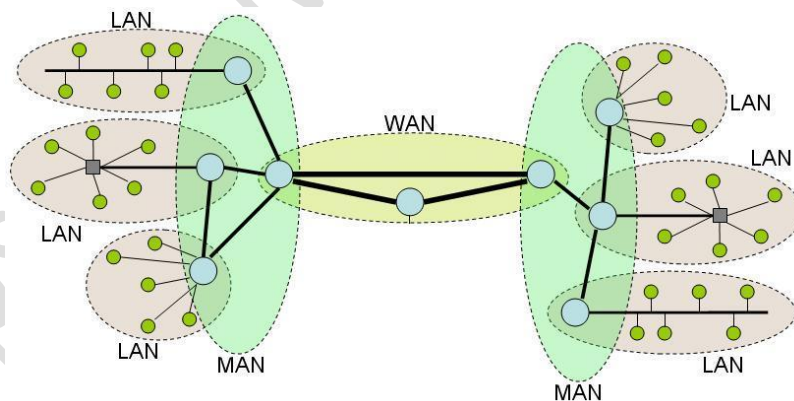
TYPES OF COMPUTER NETWORK

Local Area Network (LAN)

It is also called LAN and designed for small physical areas such as an office, group of buildings or a factory. LANs are used widely as it is easy to design and to troubleshoot. Personal computers and workstations are connected to each other through LANs. We can use different types of topologies through LAN, these are Star, Ring, Bus, Tree etc. LAN can be a simple network like connecting two

computers, to share files and network among each other while it can also be as complex as interconnecting an entire building. LAN networks are also widely used to share resources like printers, shared hard-drive etc.

Characteristics of LAN

- LAN's are private networks, not subject to tariffs or other regulatory controls.
- LAN's operate at relatively high speed when compared to the typical WAN.
- There are different types of Media Access Control methods in a LAN, the prominent ones are Ethernet, Token ring.
- It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.

Applications of LAN

- One of the computers in a network can become a server serving all the remaining computers called clients. Software can be stored on the server and it can be used by the remaining clients.
- Connecting locally all the workstations in a building to let them communicate with each other locally without any internet access.
- Sharing common resources like printers etc are some common applications of LAN.

Advantages of LAN

- **Resource Sharing:** Computer resources like printers, modems, DVD-ROM drives and hard disks can be shared with the help of local area networks. This reduces cost and hardware purchases.
- **Software Applications Sharing:** It is cheaper to use same software over network instead of purchasing separate licensed software for each client a network.
- **Easy and Cheap Communication:** Data and messages can easily be transferred over networked computers.
- **Centralized Data:** The data of all network users can be saved on hard disk of the server computer. This will help users to use any workstation in a network to access their data. Because data is not stored on workstations locally.
- **Data Security:** Since, data is stored on server computer centrally, it will be easy to manage data at only one place and the data will be more secure too.
- **Internet Sharing:** Local Area Network provides the facility to share a single internet connection among all the LAN users. In Net Cafes, single internet connection sharing system keeps the internet expenses cheaper.

Disadvantages of LAN

- **High Setup Cost:** Although the LAN will save cost over time due to shared computer resources, but the initial setup costs of installing Local Area Networks is high.

- **Privacy Violations:** The LAN administrator has the rights to check personal data files of each and every LAN user. Moreover he can check the internet history and computer use history of the LAN user.
- **Data Security Threat:** Unauthorized users can access important data of an organization if centralized data repository is not secured properly by the LAN administrator.
- **LAN Maintenance Job:** Local Area Network requires a LAN Administrator because, there are problems of software installations or hardware failures or cable disturbances in Local Area Network. A LAN Administrator is needed at this full time job.
- **Covers Limited Area:** Local Area Network covers a small area like one office, one building or a group of nearby buildings.

Metropolitan Area Network (MAN)

It was developed in 1980s.It is basically a bigger version of LAN. It is also called MAN and uses the similar technology as LAN. It is designed to extend over the entire city. It can be means to connecting a number of LANs into a larger network or it can be a single cable. It is mainly hold and operated by single private company or a public company.

Characteristics of MAN

- It generally covers towns and cities (50 km)
- Communication medium used for MAN are optical fibers, cables etc.
- Data rates adequate for distributed computing applications.

Advantages of MAN

- Extremely efficient and provide fast communication via high-speed carriers, such as fibre optic cables.
- It provides a good back bone for large network and provides greater access to WANs.
- The dual bus used in MAN helps the transmission of data in both directions simultaneously.
- A MAN usually encompasses several blocks of a city or an entire city.

Disadvantages of MAN

- More cable required for a MAN connection from one place to another.
- It is difficult to make the system secure from hackers and industrial espionage(spying) graphical regions.

Wide Area Network (WAN)

It is also called WAN. WAN can be private or it can be public leased network. It is used for the network that covers large distance such as cover states of a country. It is not easy to design and maintain. Communication medium used by WAN are PSTN or Satellite links. WAN operates on low data rates.

Characteristics of WAN

- It generally covers large distances (states, countries, continents).
- Communication medium used are satellite, public telephone networks which are connected by routers.

Advantages of WAN

- Covers a large geographical area so long distance business can connect on the one network.
- Shares software and resources with connecting workstations.
- Messages can be sent very quickly to anyone else on the network. These messages can have picture, sounds or data included with them (called attachments).
- Expensive things (such as printers or phone lines to the internet) can be shared by all the computers on the network without having to buy a different peripheral for each computer.
- Everyone on the network can use the same data. This avoids problems where some users may have older information than others.

Disadvantages of WAN

- Need a good firewall to restrict outsiders from entering and disrupting the network.
- Setting up a network can be an expensive, slow and complicated. The bigger the network the more expensive it is.
- Once set up, maintaining a network is a full-time job which requires network supervisors and technicians to be employed.

Security is a real issue when many different people have the ability to use information from other computers. Protection against hackers and viruses adds more complexity and expense.

26. Define Computer Networks and Network Topology.

COMPUTER NETWORK

Definition

"A computer network is a system in which, a large number of computers are interconnected together to communicate with each other via a communication medium".

OR

"Two or more computers connected together through a communication medium to share resources".

Purpose

The main purpose of any computer network is resource sharing. The computers connected in a network can share data and information stored on any computer. Other resources e.g. hard disk, CD ROM etc. can also shared.

NETWORK TOPOLOGY

Definition

"The arrangement of computers in a network is called network topology."

OR

"The physical layout of a network is called network topology".

OR

"The scheme of connecting a number of computers in the form of a network is called network topology".

It is the physical layout of computers, cables and other devices on a network. Every network is designed according to a specific topology.

There are following network topologies used to form a network.

1. Bus Topology
2. Star Topology
3. Ring Topology
4. Tree Topology
5. Mesh Topology
6. Hybrid Topology

BUS TOPOLOGY

In Bus topology, all computer or nodes are connected to a common communication medium. A special type of central wire is used as the communication medium. This central wire is called bus or backbone. All the computers are attached to the bus. The ends of the bus are closed with terminators.

Terminator

A terminator is a special device used to absorb signals.

Working of Bus Topology
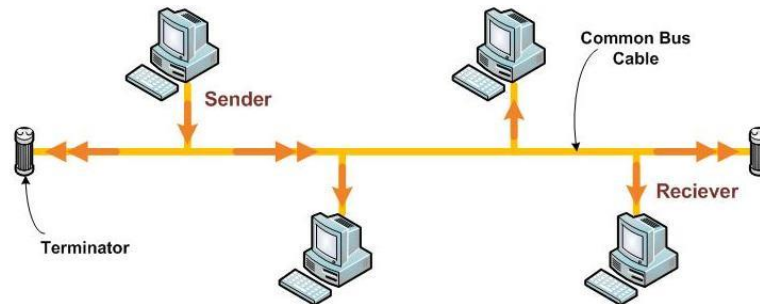
The computer that sends data also attaches the address of the destination computer with the data. All computers connected to the bus receive the data but only that computer accepts it. Whose address matches the address attached with the data. Other computers discard the data. In this topology only one computer at a time can send data. Therefore the speed of the network reduces as the number of computers attached to the bus increases.

Advantages

- It is simple and reliable for very small networks.
- It is easy to use and understand.
- Its cost is very low as compared to other topologies.
- It can easily be extended to include more computers in network.
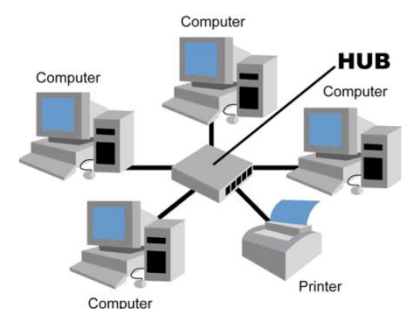
Disadvantages

- If one workstation goes faulty, all workstations are affected.
- It can be used only for a few computers. As the number of computers increases, the network gets slower.
- It is difficult to troubleshoot a bus.
- If the bus cable is damage, whole network goes down.

STAR TOPOLOGY

In star topology, all the computers or nodes are directly connected to a central device. The devices that normally used as central device are called hub and switch.

Working of Star Topology

Each computer on a Star network communicates with the central device. First data is sent to the hub/switch and then hub/switch transmits data to other computers. A star network uses a significant amount of cable because each terminal is wired back to the central device, even if two

terminals are side by side several hundred meters away from the central device. All routing decisions are made by the central device.

Advantages

- It is easy to modify a star network. New computers can be added to the central device or any computer can be removed without affecting the network.
- It is usually easy to troubleshoot a star network.
- Resource sharing is possible among computers. E.g. hard disk, CD etc
- If any computer in the star network fails, rest of the network is not affected.

Disadvantages

- If the central device fails, the whole network breaks down.
- Star network requires more communication cable than any other network
- It is very costly.

RING TOPOLOGY

In ring topology, each computer is connected to two adjacent nodes. Each computer or node is connected to the next computer and the last computer is connected to the first. Thus a ring topology formed.

Working of Ring Topology

Data is transmitted around the ring in one direction only. Each computer receives data from the previous computer and transmits it to the next computer till the destination computer receives the data. Since each computer re-transmits what it receives, signal loss does not occur. When the workstation is powered on, it connects itself into the ring. When power is off, it disconnects itself from the ring and allows the information to bypass the workstation.

Information travels around the ring from one workstation to the next. Each packet of data sent on the ring is prefixed by the address of the station to which it is being sent to. When a packet of data arrives the workstation checks to see if the packet address is the same as its own. If it is, it grabs the data in the packet. If the packet does not belong to it, it sends the packet to the next workstation in the ring.
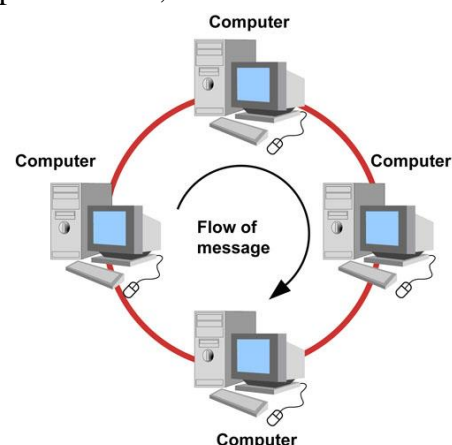
Disadvantages

- A single break in the cable can disturb the entire network.
- It is difficult to manage the ring network because it is difficult to add or remove a single computer.
- It is expensive than Bus topology.

TREE TOPOLOGY

Basically the tree topology integrates multiple star topologies together onto a bus. In its simplest form only hubs of different star networks are connected to together. Each hub acts as a branch of central tree. This type of network has combined features of bus and star network. Tree topology is used for the expansion of an existing network. The bus works as the backbone cable for the network.
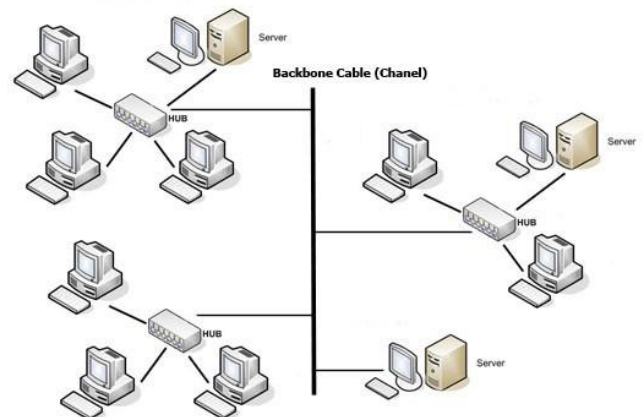

Advantages:

- Point- to- point wiring for individual segments
- Supported by many hardware and software producers

Disadvantages:

- Wiring and configuration is more difficult as compare to other topologies.
- If the backbone (central cable) breaks down, then the whole network breaks down.
- Overall length of each section is limited by the type of wiring used.
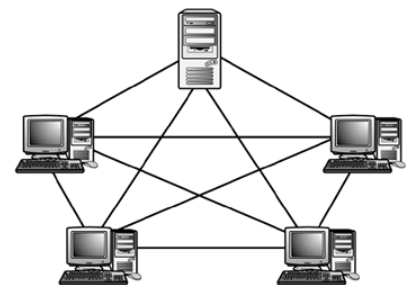
MESH TOPOLOGY

Mesh topology is also called a completely connected network. It has a separate physical link for connecting each node to any other node. Thus each computer of such network has a direct dedicated link, called a point-to-point link with all other computer of the network. The control is distributed among each computer deciding its communication priorities.

Advantages:

- This type of network is very reliable, as any line back down will affect on the point to point communication between the connected computers.
- Due to multiple links mesh network can work fine even under severe loads.
- Communication between two nodes is very fast.

Disadvantages:

- It is very expensive system from the point of view of line cost.
- Mesh network is difficult to create and very difficult to maintain.
- Addition of new nodes in the network is very difficult.

HYBRID TOPOLOGY

Different network configurations have their own advantages and disadvantages. Hence, in reality, a pure star or ring or mesh network is rarely used instead, an organization will use some sort of hybrid network, which is the combination of two or more different network topologies. The exact configuration of the network depends on the need and overall organizational structure of the company involved.
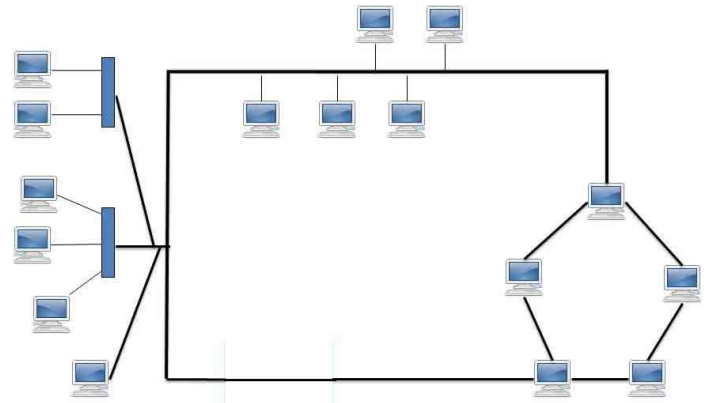
27. What is internet? Write a note on advantages and disadvantages of internet?

INTERNET

The internet is a huge network of computers, which link many different types of computers all over the world. It is a network of networks, which share a common mechanism for addressing (identifying) computers, and a common set of communication protocol for communication between two computers on the network.

Advantages of Internet

An Internet was developed with the purpose to share information but now it provides you a lot of advantages, some of them are given below;

Advertising

Today, products are advertised by most of the commercial organizations through Internet. It's effective and inexpensive method for the marketing of goods. The services and products could be given lovely and attractive method to the people round the world

Information

The Web enables students to see the most recent news on a particular topic they're learning. If they're learning American politics they may do an information search and discover what is happening on the planet of politics at that very time. It will help them link what they're understanding how to real life. Additionally, it may keep them thinking about a topic.

Search Engines

Search engines are applications or web sites over the internet, which provide facility to user of the internet far location a web page from World Wide Web according to the given criteria. Examples: **www.google.com** etc.

E-mails

Internet provides you the facility to send letters or messages anywhere in the world.

News

With the help of internet, we can get updated news about any country of the world and about hot tissues ant time.

Booking Air Tickets

Booking air tickets is an important advantage of internet .you can reserve any ticket of any part of the world with its help.

Job Search

With the help of internet any person can search job all over the world. Many websites provides

this facility. A person can also apply for job   through internet.

Entertainment

Internet provides many types of entertainment for us .we can play games, watch movies, listen music, see matches etc. online.

Research

Internet provides many facilities for research work we can see different types of information on different topics. Many websites provides this facility for our extra knowledge and guidance.

Education

With the help of internet, you can apply for admissions in any universities of the world and can also study virtually.

Encyclopedia

Occasionally, encyclopedia mightn't constantly be accessible to individuals and so they might have trouble with in getting the use of the actual guides within the selection. If that's the case, the encyclopedia of various topics on the Web could be useful

Online Training

The facility is provided by the internet to obtain an online training. Several web sites of different colleges offer lessons and classes on different subjects or subjects. You may also obtain these classes or lessons in your personal computer. You are able to hear these classes repeatedly and obtain a large amount of understanding. It's very simple and cheap method to get training.

Online Medical Guidance

Several web sites will also be on the Web to obtain details about various conditions. You are able to consult with a cell of on-line physicians to obtain guidance about any medical problem. In addition, lots of material can also be on the Web for research in medical industry.

Online Banking

With the help of internet, accountholder of a bank can check his account and can also transfer money from his account to other accounts by sitting at his home.

E-Commerce

E-Commerce (Electronic Commerce) means to carry out the financial transactions using internet.

Online Results

Many colleges and universities provide the facility of online results. The students can see their results from anywhere in the world through internet.

Chatting

Those who have no friends or who have friends in far areas can chat on internet any time and can discuss their personal issues.

Communications

You can communicate with other through internet around the world .You can talk by watching to one another; just you are talking with your friends in your drawing room .For this purpose, different services are provided on the internet such as; Chatting, Video conferencing, E-Mail Internet etc.

Disadvantages of Internet

These are the disadvantages of internet.

Use of some Unfair Mean Resources

Some people use some unfair mean resources to purchase goods on internet and generate fake visa card numbers that results into big loss for companies.

Hacking of Data

Different people on internet try to hack data of information of others people.

Cyber Crimes

Different people use internet for doing crimes. Crimes on internet are called cyber crimes. For example: Hacking the credit card numbers, hacking of data etc.

Wasting of Time

Young age boys and girls waste their precious time on internet in chatting.

Viruses

Internet is the most important source of spreading Computer viruses. People spread computer viruses through Internet and E-mails.

Security Problems

Internet has also created many types of security problems for computer users. By using internet people are try to hack data of other people.

Increase of Expenses

Internet has increased the living expenses, as you have to pay for using it.

Immorality

Some websites contains immoral materials in the form of text, pictures or movies etc. These websites damage the character of new generation.

Filtration of Information

When a keyword is given to a search engine to search information of a specific topic, a large number of related links a displayed. In this case, it becomes difficult to filter out the required information.

Accuracy of Information

A lot of information about a particular topic is stored on websites. Some information may be incorrect or not authentic. So, it becomes difficult to select the correct information. Sometimes you

may be confused.

Theft of Personal Details

When using the Internet, there's high likelihood that the personal particulars like address, title and credit card number might be used by people and employed for deceptive purposes. Thus, the Internet has got the potential to create your life easy and easy, along with cause havoc in your life. Their impact is mainly determined by the options you make while you're online. With intelligent use, you are able to have the ability to utilize its limitless potential

Spamming

Spamming means distribution of unwanted e-mails in good sized quantities. They're worthless and the whole system is unnecessarily blocked by them. These actions are treated as illegal.

English Language Problems:

Most of the information on the internet is available in English language. So, some people cannot avail the facility of internet.

28. WEB/NETWROK DEVICES

Network Hub:

Network Hub is a networking device which is used to connect multiple network hosts. A network hub is also used to do data transfer. The data is transferred in terms of packets on a computer network. So when a host sends a data packet to a network hub, the hub copies the data packet to all of its ports connected to. Like this, all the ports know about the data and the port for whom the packet is intended, claims the packet.

However, because of its working mechanism, a hub is not so secure and safe. Moreover, copying the data packets on all the interfaces or ports makes it slower and more congested which led to the use of network switch.

Network Switch:

Like a hub, a switch also works at the layer of LAN (Local Area Network) but you can say that a switch is more intelligent than a hub. While hub just does the work of data forwarding, a switch does 'filter and forwarding' which is a more intelligent way of dealing with the data packets.

So, when a packet is received at one of the interfaces of the switch, it filters the packet and sends only to the interface of the intended receiver. For this purpose, a switch also maintains a CAM (Content Addressable Memory) table and has its own system configuration and memory. CAM table is also called as forwarding table or forwarding information base (FIB).

Modem:

A Modem is somewhat a more interesting network device in our daily life. So if you have noticed around, you get an internet connection through a wire (there are different types of wires) to your house. This wire is used to carry our internet data outside to the internet world. However, our computer generates binary data or digital data in forms of 1s and 0s and on the other hand, a wire carries an analog signal and that's where a modem comes in. A modem stands for (**Mo**dulator + **Dem**odulator). That means it modulates and demodulates the signal between the digital data of a computer and the analog signal of a telephone line.

Network Router:

A router is a network device which is responsible for routing traffic from one to another network. These two networks could be a private company network to a public network. You can think of a router as a traffic police who directs different network traffic to different directions.

Bridge:

If a router connects two different types of networks, then a bridge connects two sub networks as a part of the same network. You can think of two different labs or two different floors connected by a bridge.

Repeater:

A repeater is an electronic device that amplifies the signal it receives. In other terms, you can think of repeater as a device which receives a signal and retransmits it at a higher level or higher power so that the signal can cover longer distances.

29. Different Web terminologies

FTP: File Transfer Protocol

File Transfer Protocol (FTP) enables file sharing between hosts. FTP uses TCP to create a virtual connection for control information and then creates a separate TCP connection for data transfers. The control connection uses an image of the TELNET protocol to exchange commands and messages between hosts. The key functions of FTP are:

- to promote sharing of files (computer programs and/or data);
- to encourage indirect or implicit (via programs) use of remote computers;
- to shield a user from variations in file storage systems among hosts; and
- to transfer data reliably and efficiently.

FTP, though usable directly by a user at a terminal, is designed mainly for use by programs. FTP control frames are TELNET exchanges and can contain TELNET commands and option negotiation. However, most FTP control frames are simple ASCII text and can be classified as FTP commands or

FTP messages. FTP messages are responses to FTP commands and consist of a response code followed by explanatory text.

HTTP: Hypertext Transfer Protocol

The Hypertext Transfer Protocol (HTTP) is an application-level protocol with the lightness and speed necessary for distributed, collaborative, hypermedia information systems. HTTP has been in use by the World-Wide Web global information initiative since 1990. HTTP allows an open-ended set of methods to be used to indicate the purpose of a request. It builds on the discipline of reference provided by the Uniform Resource Identifier (URI), as a location (URL) or name (URN), for indicating the resource on which a method is to be applied. Messages are passed in a format similar to that used by Internet Mail and the Multipurpose Internet Mail Extensions (MIME).

HTTP is also used as a generic protocol for communication between user agents and proxies/gateways to other Internet protocols, such as SMTP, NNTP, FTP, Gopher and WAIS, allowing basic hypermedia access to resources available from diverse applications and simplifying the implementation of user agents.

The HTTP protocol is a request/response protocol. A client sends a request to the server in the form of a request method, URI, and protocol version, followed by a MIME-like message containing request modifiers, client information, and possible body content over a connection with a server. The server responds with a status line, including the message's protocol version and a success

or error code, followed by a MIME-like message containing server information, entity meta information, and possible entitybody content.

The first version of HTTP, referred to as HTTP/0.9, was a simple protocol for raw data transfer across the Internet. HTTP/1.0, as defined by RFC 1945, improved the protocol by allowing messages to be in the format of MIME-like messages, containing meta information about the data transferred and modifiers on the request/response semantics. However, HTTP/1.0 does not sufficiently take into consideration the effects of hierarchical proxies, caching, the need for persistent connections, or virtual hosts. "HTTP/1.1" includes more stringent requirements than HTTP/1.0 in order to ensure reliable implementation of its features. There is a secure version of HTTP (S-HTTP) specification, which will be discussed in a separate document.

IP: Internet Protocol (IPv4)

The Internet Protocol (IP) is a network-layer (Layer 3 in the OSI model) protocol that contains addressing information and some control information to enable packets to be routed in a network. IP is the primary network-layer protocol in the TCP/IP protocol suite. Along with the Transmission Control Protocol (TCP), IP represents the heart of the Internet protocols. IP is equally well suited for both LAN and WAN communications. IP has two primary responsibilities: providing connectionless,

best-effort delivery of datagrams through a network; and providing fragmentation and reassembly of datagrams to support data links with different maximum-transmission unit (MTU) sizes.

The IP addressing scheme is integral to the process of routing IP datagrams through an internetwork. Each IP address has specific components and follows a basic format. These IP addresses can be subdivided and used to create addresses for subnetworks. Each computer (known as a host) on a TCP/IP network is assigned a unique 32-bit logical address that is divided into two main parts: the network number and the host number. The network number identifies a network and must be assigned by the Internet Network Information Center (InterNIC) if the network is to be part of the Internet. An Internet Service Provider (ISP) can obtain blocks of network addresses from the InterNIC and can itself assign address space as necessary. The host number identifies a host on a network and is assigned by the local network administrator. When you send or receive data (for example, an e-mail note or a Web page), the message gets divided into little chunks called packets. Each of these packets contains both the sender's Internet address and the receiver's address. Because a message is divided into a number of packets, each packet can, if necessary, be sent by a different route across the Internet. Packets can arrive in a different order than the order they were sent in. The Internet Protocol just delivers them. It's up to another protocol, the Transmission Control Protocol (TCP) to put them back in the right order. All other protocols within the TCP/IP suite, except ARP and RARP, use IP to route frames from host to host. There are two basic IP versions, IPv4 and IPv6.

DNS: Domain Name System (Service) protocol

Domain Name System (DNS) is a distributed Internet directory service. DNS is used mostly to translate between domain names and IP addresses and to control Internet email delivery. Most Internet services rely on DNS to work, and if DNS fails, web sites cannot be located and email delivery stalls. DNS has two independent aspects:

1. It specifies the name syntax and rules for delegating authority over names. The basic syntax is: local.group.site

2. It specifies the implementation of a distributed computing system that efficiently maps names to addresses.

In the DNS naming scheme, a decentralized and hierarchical mechanism is used by the delegating authority for parts of the namespace and distributing responsibility for mapping names and addresses. The naming scheme of DNS is used to assign network device names globally and is implemented by geographically distributed sets of severs to names to addresses.

In theory, the domain name standard in DNS protocol specifies an abstract hierarchical namespace with arbitrary values for labels. Any group can build an instance of the domain system to choose labels for all parts of its hierarchy. However most users of the DNS protocols follow the hierarchical

labels used by the official Internet domain system. Some of the top level domains are: COM, EDU, GOV, NET, ORG, BIZ ... plus many country codes.

The distributed scheme of DNS allows efficient and reliable mapping of names to IP addresses. Most names can be mapped locally and a set of servers operating at multiple sites cooperatively solve the mapping problem of a large network. Because of the distributing nature, no single machine failure will prevent the DNS from operating correctly.

Search Engines

A web search engine or Internet search engine is a software system that is designed to carry out web search (Internet search), which means to search the World Wide Web in a systematic way for particular information specified in a textual web search query. The search results are generally presented in a line of results often referred to as search engine results pages (SERPs). The information may be a mix of links to web pages, images, videos, infographics, articles, research papers, and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained only by human editors, search engines also maintain real-time information by running an algorithm on a web crawler. Internet content that is not capable of being searched by a web search engine is generally described as the deep web.

- Designed to assist you in searching through the enormous amount of information on the Web
- No single search tool has everything
- Each engine is a large database which utilizes different search techniques and tools (spiders or robots) to build indexes to the Internet (some also utilize submissions and administration)
    - Yahoo
    - Altavista
    - Excite
    - Google
    - NorthernLights
    - Hotbot

30. E-commerce

E-commerce is the activity of buying or selling of products on online services or over the Internet. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.

Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle although it may also use other technologies such as e-mail. Typical e-commerce transactions include the purchase of online books (such as Amazon) and music purchases

(music download in the form of digital distribution such as iTunes Store), and to a less extent, customized/personalized online liquor store inventory services. There are three areas of e-commerce: online retailing, electronic markets, and online auctions. E-commerce is supported by electronic business.

E-commerce businesses may also employ some or all of the followings:

- Online shopping for retail sales direct to consumers via Web sites and mobile apps, and conversational commerce via live chat, chatbots, and voice assistants[3]
- Providing or participating in online marketplaces, which process third-party business-to-consumer or consumer-to-consumer sales
- Business-to-business buying and selling;
- Gathering and using demographic data through web contacts and social media
- Business-to-business (B2B) electronic data interchange
- Marketing to prospective and established customers by e-mail or fax (for example, with newsletters)
- Online financial exchanges for currency exchanges or trading purposes.

31. Professional practice

Objectives

- Explain you the Role and responsibilities of yours's as a professional
- When After Studies you will Enter in the professional Sector how should you behave like a professional Act like a professional
- How organizations Are working
- What Strategies tools and techniques they Followed E.g.
- What they are doing in Finance and what Software Engineers are doing

Definition of profession

A paid occupation, especially one that involves prolonged training and a formal Qualification

In Simple way: you can say Way of Earning

Professional:

A person who performs that profession is known as professional particular knowledge and skills necessary to perform their specific role within that profession

Some professions and their Professionals

- Doctorate profession
- Engineering profession
- Software Profession

- ➢ Management profession

Professional Responsibilities in software engineer's professions

- ➢ For software Engineers there are some responsibilities on them
- ➢ Network Specialist
- ➢ Software Engineer
- ➢ Software Development Installation
- ➢ Planning and the management of an organization technology life Cycle
- ➢ Software maintenance team

Your Field is Computer Sciences and your Domain is Different like Some wants to become a

- ➢ Software testing Engineers
- ➢ QA tester
- ➢ Web Developer
- ➢ Database Administrations
- ➢ Software Quality Engineers
- ➢ Software Engineers

Governing Body (CEO Managers BOD's)

- ➢ Define the Role of Responsibilities
- ➢ Rules and regulations
- ➢ Code of Conduct
- ➢ All of these Discussed things are done by the Governing body

<div align="center">

Professionalism

</div>

Profession Doesn't mean what you do it's depend on who are you???

Professionalism is a way of thinking and living rather than an accumulating of learning. It is your Attitude it is not about the studies which you gained in the University level degree is just a paper and your pass to enter in the Organization and then you have to show your skills and communications to prove yourself

Traits of a profession

We will see what types of traits are affiliated with the profession

- i.   Required Special skills
- ii. Society Motivation
- iii. Personal Standard of excellence
- iv. Giving back to Society
  - o   You are a part of Society
  - o   You are nothing individually
  - o   You have complete your learning here

A Professional behaves ethically

➢ One of the most important thing is

➢ A professional is always look after towards the ethics

➢ Ethics means something more than "Law" && "Morals"

➢ It carries an Additional meaning of "Rightness"

Breaking the law: It defines the Governing body what is right what is wrong

Breaking a Moral: Defined by the Society (Define your religion)

Trait # 1 of a professional   Seriousness

➢ Serious about Job

➢ A job is only a Job

➢ He will understand his Job and his Responsibilities what he going to Do

➢ And he will have to Complete his job at any Cost

Trait # 2 of a professional   Wanting to do better

➢ He/she will always to do better

➢ Every new day is a challenge to improve his performance

➢ Their performance is not only dependent upon the one thing every task every variable and Every Relationship and Detail they are trying to do better

Trait # 3 of a professional   Dealing with Unexpected

➢ When you are Working in an organization there will be Everything

➢ Argue with the Subordinate

➢ Argue with the Boss

➢ If you are following behind your Schedule Argue with the HR

How you will React in these Situations

Leave the Job????   Argument Fighting????

Talked at his back????   fighting with that?????

➢ If you are at mistake and admit your fault, then you are a good professional

➢ A true professional will never put his feeling with his Attitude

➢ He/she will not put the anger of another person on you

➢ He/she will always ready to deal with Unexpected

Trait # 4 of a professional   Communication skills

Not just in the professional life communication skills is very important to success in the world

➢ Clear

➢ Concise

➢ Confident

- ➢ Not Shivering
- ➢ Your statement is clear to your subordinate
- ➢ Lake of confidence

Then your knowledge set and skills set might be in Secondary importance and this thin will harm you in long term

- ➢ A good professional will always use the better communication skills To prove his self

Trait # 5 of a professional   Attitude

- ➢ Your Attitude is Everything Attitude basically reflects your personality
- ➢ Their positive Attitude leads them to the leadership

Trait # 6 of a professional   Helpfulness

- ➢ Understand that real success in the workplace in team work
- ➢ Make a suggestion
- ➢ Offer a compliment when it deserves
- ➢ Single Entity is not working you are nothing individual
- ➢ You can't maintain yourself
- ➢ You should be a team player
- ➢ If someone wants advice, he will give the honest opinion
- ➢ Don't Criticize him while you are discussing the suggestions from this person will be discouraged
- ➢ If you are giving the suggestions then you can say

  you are doing well but if you can use this tools && techniques that will be really helpful to you
- ➢ Your way of suggestion is like in such a way that the self-respect of the subordinate is not hurt
- ➢ You should complement him if he works well

Trait # 7 of a professional   Taking the Initiative

- ➢ When you are in the working environment
- ➢ You will not depend on others and don't rely on others
- ➢ When task is at your table you will not see who will do this Because it's you Responsibility to complete your task
- ➢ He will take the Initiative to get things Done
- ➢ He knows his capabilities skills and knowledge and he will have done his task as soon as possible

Trait # 8 of a professional   Cool Under pressure Level headed and calm

we are humans it depends upon our fate Our day will be good or bad.

- ➢ Good professional always treat && put aside his feelings and remain calm
- ➢ They don't lose their heart and remain calm
- ➢ Stressful Acting == just worst the job

Trait # 9 of a professional   Remain focused

- ➢ Stay focused on the task and Goals ahead
- ➢ One of the most important characteristics of a professional is he will take his objective and project he will never loses his sight from the ultimate of goal

Task Distribution

- ➢ Resolve the problems and he will move on to his Goal Direction.