BCS-011 : COMPUTER BASICS AND PC SOFTWARE

December 2012

1.

(a) Convert the following hexadecimal numbers to binary and decimal numbers. 5

(i) (AB)Hex

(ii) (22F) Hex

(i) (AB)Hex

Ans: hexadecimal to binary:

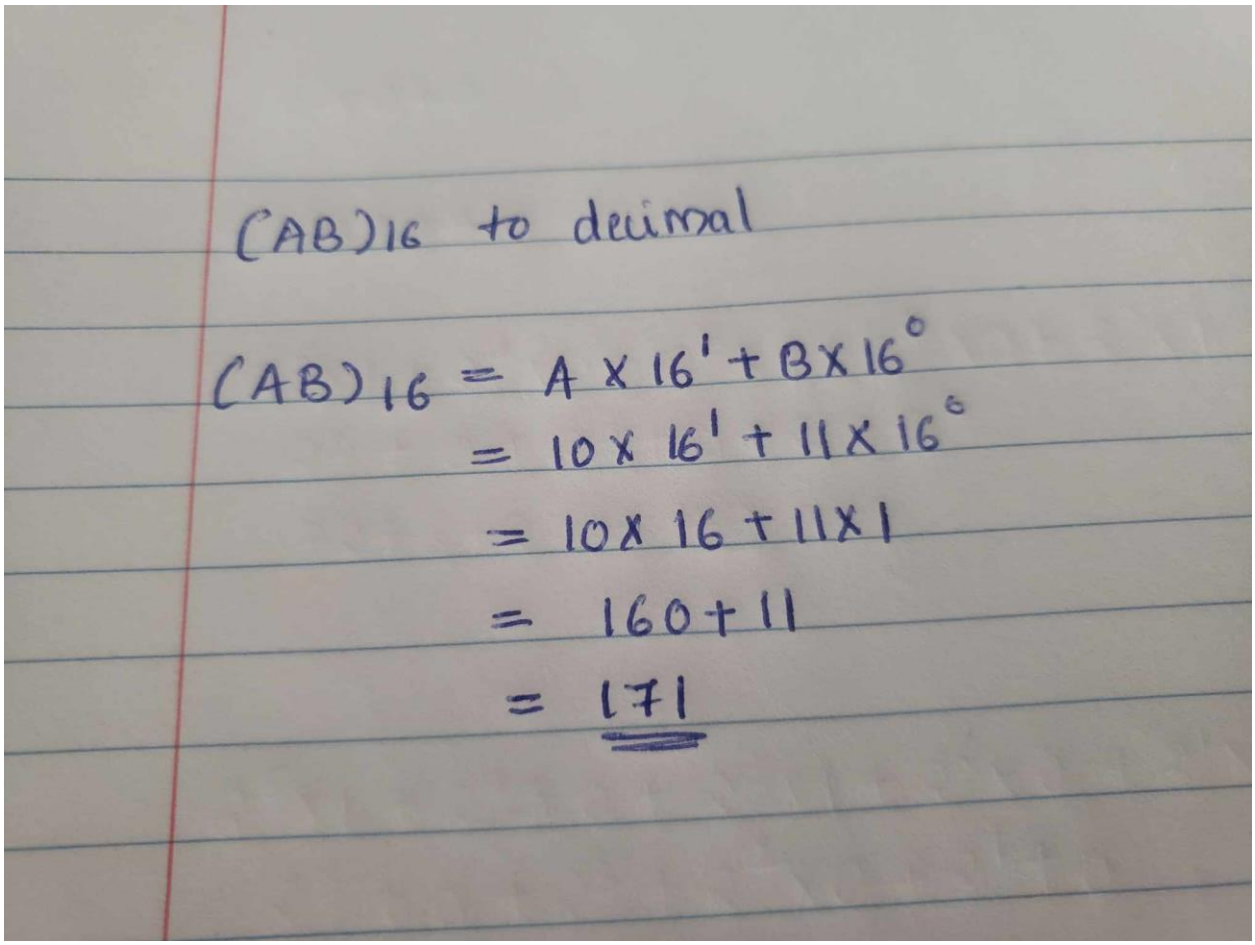
Divide the given hexadecimal number into individual digits. Assign 4-bit binary equivalents to each hexadecimal digit.

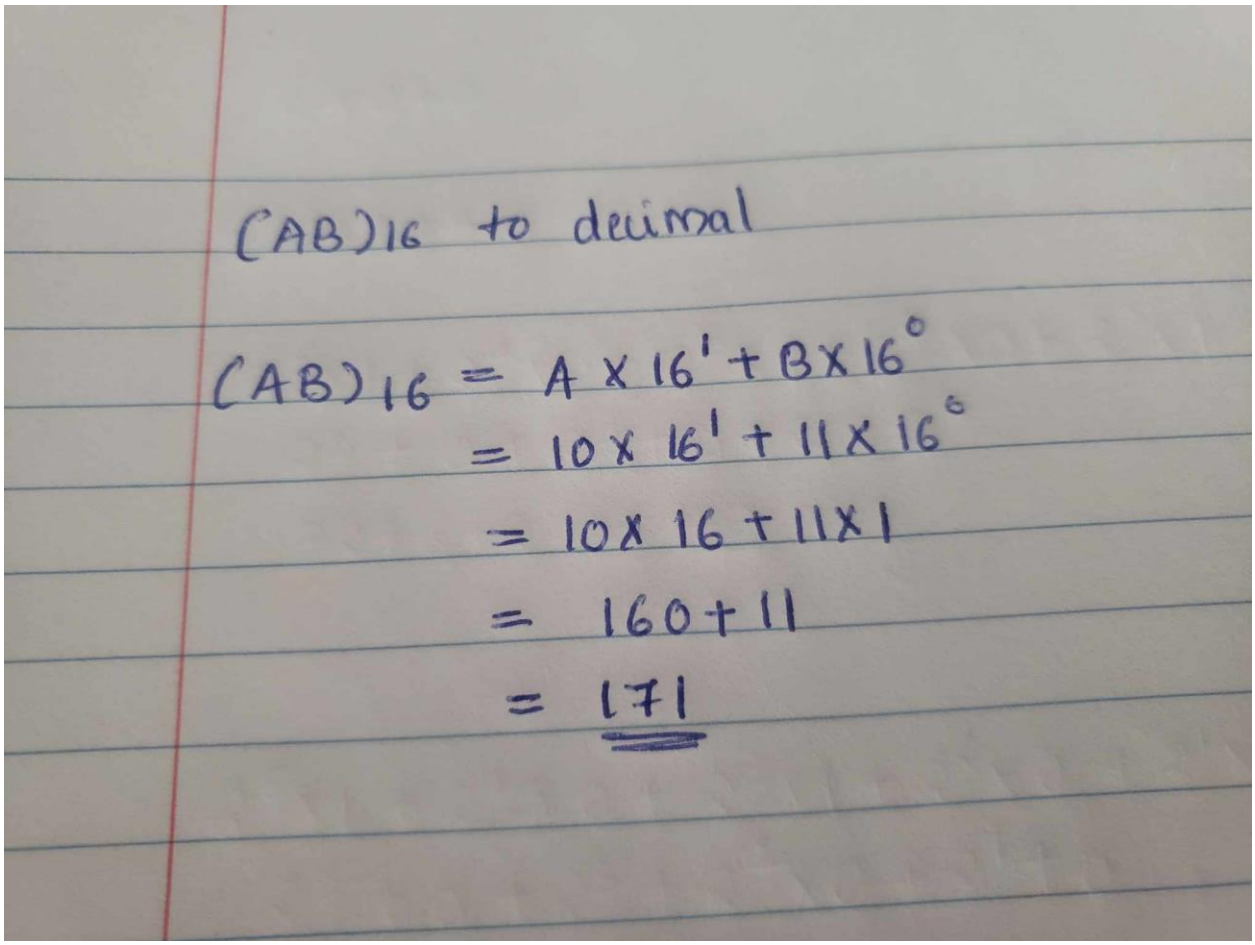
(AB)16 = A B

1010 1011

Thus, (AB)16=(10101011)2

Hexadecimal to decimal:


(AB)16 to decimal
(AB)16 = A X 16^1 + B X 16^0
= 10 X 16^1 + 11 X 16^0
= 10 X 16 + 11 X 1
= 160 + 11
= 171



(ii) (22F) Hex

Ans:

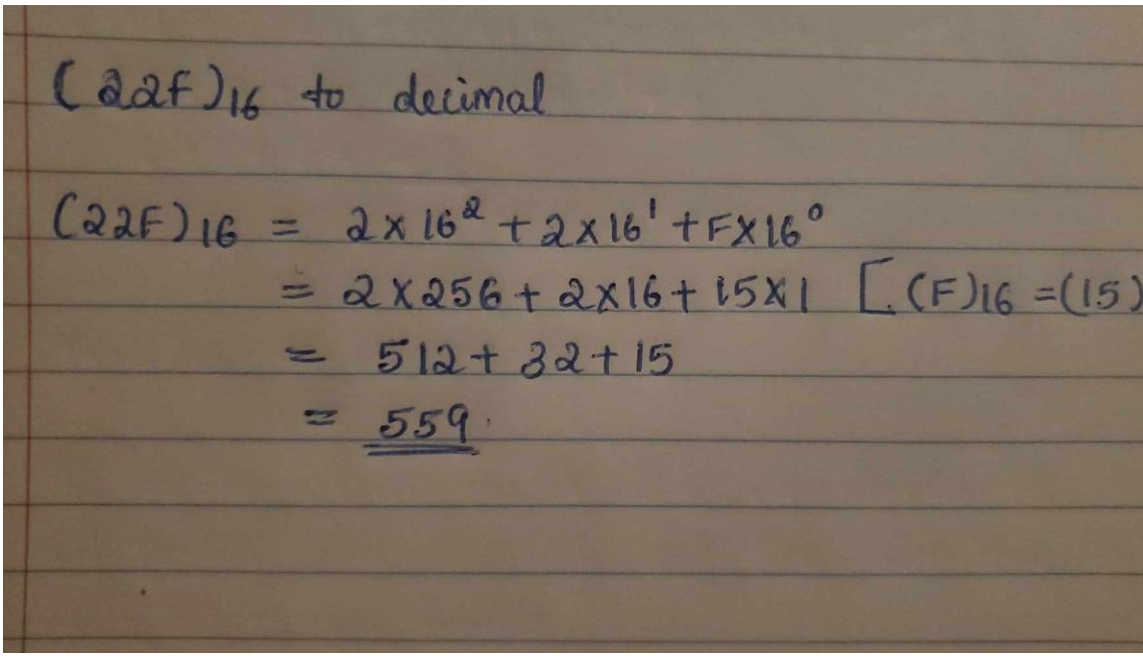
Hexadecimal to binary:

(22F)16 = 2 2 F

0010 0010 1111

Thus, (22F)16= (001000101111)

Hexadecimal to decimal:



(b) How do you calculate access time on a magnetic disk ? Explain with the help of a suitable example. 5

Ans: Access time on a magnetic disk refers to the total time it takes for the disk to locate and transfer data. A track on a disk is selected in random fashion, but data is written to or read from a sector in serial fashion. In order to access information from a disk, the disk address of the desired data has to be specified. The disk address is specified in terms of track number, surface number and the sector number. Information is always written from the beginning of a sector and can be read only from the track beginning. A track on a disk is selected in random fashion, but data is written to or read from a sector in serial fashion. In order to access information from a disk, the disk address of the desired data has to be specified. The disk address is specified in terms of track number, surface number and the sector number. Information is always written from the beginning of a sector and can be read only from the track beginning.

It involves the seek time and latency time.

The time required to position the read/write head over proper track is called the seek time. Seek time varies depending on the position of the arm assembly when a read/write command is received. Seek time will be maximum if the arm assembly is positioned on the outer most track and the track to be reached is the inner most one and it will be zero if the arm assembly is already on the desired track. The average seek time is thus specified for most systems which is generally between few milliseconds to fractions of a second. For a fixed-head system, it is always 0 because there is a head for each track and no head movement is required for accessing a particular track.

Once the heads are positioned on the desired track, the head on the specified surface is activated. Since the disk is continuously rotating, this head should wait for the desired data (specified sector) to come under this head. This rotational waiting time i.e. time required to bring the needed data (i.e. starting position of the addressed sector) under the read/write head is called the latency time. Latency time is also a variable and depends on the following two parameters:

* Distance of the desired data from the initial position of the head on the specified track. * Rotational speed of the disk

The total access time for a disk is equal to the seek time plus the latency time.

Access time = Seek time + Latency time

The average access time for most disk systems is usually between 10 to 100 milliseconds.

Example:

Consider a hard disk with: 4 surfaces

64 tracks/surface

128 sectors/track

256 bytes/sector

The disk is rotating at 3600 RPM

Since seek time is not given we consider it as 0.

Latency time => 60 sec -> 3600 rotations

1 sec -> 60 rotations

Latency time= (1/60) sec = 16.67 msec.

Average Rotational latency time = (16.67)/2 = 8.33 msec.

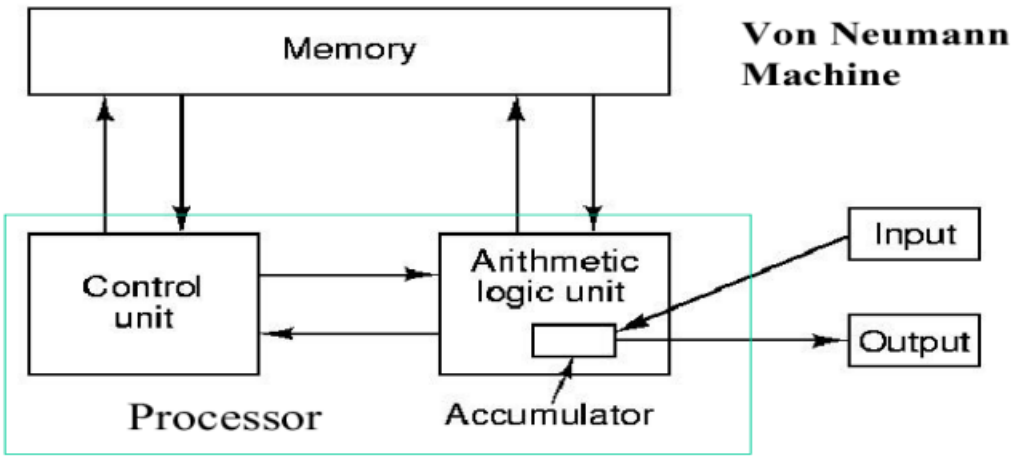
Average Access time = Seek time+ latency time

=0+8.33 msec.

=8.33msec

(c) What are the basic components of a computer as defined in Von Neumann architecture ? What is the use of each of this component ? 5

Ans: Based on Von Neumann Architecture, the basic components of a computer are : memory, an I/O system, arithmetic logic unit (ALU) and control unit (CU).



Memory: It is an important component of a computer where all the data and information are stored in the form of binary digits. Computer systems use a variety of devices for storing instructions and data. The computer memory is the place where the computer holds data and programs that are in use. Computer memory refers to the physical devices in a computer. Two major types of memories are used in computer systems:

1. RAM (Random Access Memory)
2. ROM (Read Only Memory)

I/o system: Under the control of CPU input instructions, the programme or the data is read into the main memory from the secondary storage or the input device. The data from a computer is output using output devices. If some results are evaluated by the computer and it is stored in the computer, then with the help of output devices, we can present them to the user.

Arithmetic Logic Unit (ALU): The ALU is an important component which carry the actual extension of the instructions. The processing of the data and instruction are performed by the ALU. The Arithmetic and Logic Unit performs the required micro-operations for executing the instructions. ALU allows arithmetic (add, subtract, divide, multiply) and logical operations (AND, OR, NOT etc.) operations to be carried out.

Control Unit: The control unit controls the operation of the computer's ALU, memory and input/output devices. The control unit consists of a program counter that contains the address of the instructions to be fetched and an instruction register into which instructions are fetched from memory for execution. It also provides the timing and control signals

required by other computer components. The control unit determines the sequence in which computer programs and instructions are executed.

(d) Explain the role of a translator program. How is a compiler different than an assembler ? 5

Ans: A translator or programming language processor is a computer program that converts the programming instructions written in human convenient form into machine language codes that the computers understand and process. It translates a high-level language program into a machine language program that the central processing unit (CPU) can understand. It also detects errors in the program. When a program is written in a high-level language, it has to be converted into machine code instructions, so that the processor can actually run it. This is the job of a translator program.

Source code is the code that is input to a translator and executable code is the code that is output from the translator. A translator will convert the source code into machine code (object code).

Programming languages translators are broadly divided into two categories:

* Compilers

* Interpreters

Compilers: An additional program called a compiler translates a program written in a programming language; into a new file that does not require any other program to execute itself, such a file is called an executable. e.g. C, C++, Pascal are languages that are typically compiled. Compilers produce better optimized code that generally runs faster and compiled code is self-sufficient and can be run on their intended platforms without the compiler present.

Interpreters: An interpreter is a program that translates each statement in the programming language into machine code and runs it. Such an arrangement means that to run the program one must always have the interpreter available. e.g Basic , Prolog, Perl are languages that are typically interpreted.

Difference between Compiler and Assembler:

Compiler	Assembler
It is used to convert high-level programming language code into machine language code.	It converts assembly level language code into machine language code.

Compiler considers the entire code as one and converts it at the same time.	Assembler does not convert the entire code at the same time. It converts the code line by line.
It inputs source code(high level language).	It inputs assembly level code.
The output is a mnemonic version of machine code.	The output is binary code.
It takes less execution time compared to an assembler.	It takes more time than a compiler.
C,C++,Java and C# are examples of compiled languages.	GAS,GNU is an example of an assembler.

(e) What is an algorithm ? What is the relation between a flow chart and an algorithm ? Draw a flowchart to find the sum and average of marks of a student given in 5 different subjects. Marks are given out of 100. 8

Ans: Once a problem has been defined precisely, a procedure or process must be designed to produce the required output from the given input. Since a computer is a machine that does not possess problem-solving judgmental capabilities, this procedure must be designed as a sequence of simple and unambiguous steps. Such a procedure is known as an algorithm.

The steps that comprise an algorithm must be organized in a logical, clear manner so that the program that implements this algorithm is similarly well structured. Number of steps in the algorithm should be finite, they should be executed in finite amount of time and they should give the desired output. Algorithms are designed using three basic methods of control:

a) Sequential : Steps are performed in a strictly sequential manner, each step being executed exactly once.

b) Decision/Selection : One of several alternative actions is selected and executed.

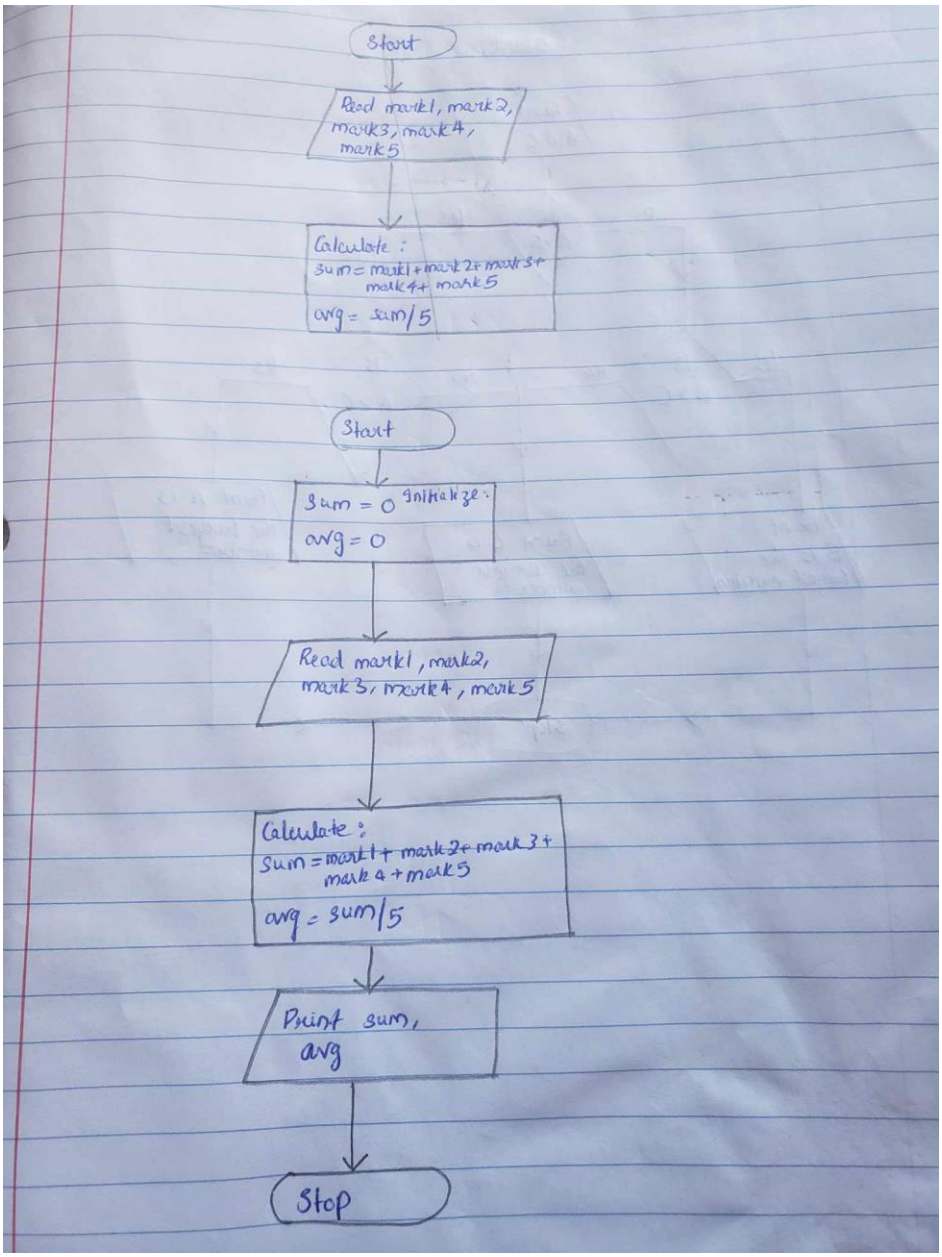
c) Repetition : One or more steps is performed repeatedly. Any algorithm can be constructed using basic methods of control.

Relation between flowchart and algorithm:

Algorithms and flowcharts are different mechanisms used for designing different programs, particularly in computer programming. An algorithm is a step-by-step summary of the procedure. While on the other hand, a flowchart illustrates the steps of a program diagrammatically.

The flowchart is a diagram which visually presents the flow of data through processing systems. This means by seeing a flow chart one can know the operations performed and the sequence of these operations in a system. Algorithms are nothing but sequence of steps for solving problems. So a flow chart can be used for representing an algorithm. A flowchart, will describe the operations (and in what sequence) are required to solve a given problem. You can see a flow chart as a blueprint of a design you have made for solving a problem.

Flowchart to find the sum and average of marks :



(f) What is a modem ? How can it be used for data transmission ? How a modem is different from hub ? 4

Ans: Modem stands for Modulator/Demodulator. The modem is defined as a networking device that is used to connect devices connected in the network to the internet. The word “modulator” means to change and the meaning of word “demodulator” is to restore to an original form. The main function of a modem is to convert the analog signals that come from telephone wire into a digital form. The modem can perform both the task of modulation and demodulation simultaneously. A modem is a communication device that converts (i.e., modulates) binary signal into analog signals for transmission over telephone lines and converts (i.e., demodulates) these analog signals back into binary form at the receiving end.

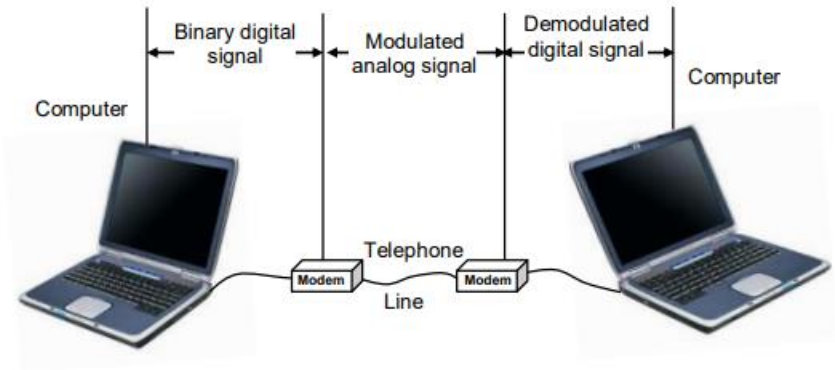
Modem is used to send data and files to other computer users using standard telephone lines. You can transfer data, exchange electronic files, and even carry on a typed conversation in real time.

Modems are of two types : Internal and External

Internal modems are hardware cards and External modems are kept outside of your computer connected either by a USB or Serial Port. Internal modems are good for general usage, as they take up less desk space, and do not require a power supply, and for most purposes, internal modems work fine. External modems tend to be slightly more expensive than internal modems.

Working of modem in data transmission:

The two main components of a modem are modulation and demodulation. The modem performs both tasks simultaneously.



When data needs to be transmitted it is first generated. Computer system generates the data which is in digital for of 0s and 1s. Next, modulation takes place. Modulation is defined as a process of converting digital data signals of the computer into analog data signals so that these signals can travel on the internet. The digital data is encoded onto a carrier wave. The resultant of modulation that is modulated data is transmitted over the communication line to the modem that is receiving it. Next is demodulation. Demodulation is defined as a process in which analog data signals from the internet are converted into digital data signals so they can be understood by computer systems. In the process of demodulation the digital data from the carrier wave is decoded. The resultant of demodulation that is demodulated data is being sent to the computer systems for use.

Modem vs hub

Modem	Hub
A modem is a device that takes digital information and transforms it into analog-digital signals that may be sent via wires.	Hubs are devices used in networking that connects a number of different devices to one another.
It operates at the data link layer.	It operates at the physical layer.
A modem can be used by a single computer as is.	It allows multiple computers to be connected together.
Modems are used to connect devices to communication channels.	Hubs are used to connect devices to a Local Area Network.

(g) What is a DNS ? How is it used for identifying web addresses ? Explain with the help of an example. 5

Ans: The Domain Name System is the phonebook of the Internet. DNS translates domain names to IP addresses so browsers can load Internet resources. Domain Name System (DNS) should keep track of address of each computer or any other internet device and email addresses. The name servers translates the web address or email address to respective IP address.

DNS is a fundamental component of the internet that translates human-friendly domain names into IP addresses. This process allows users to access websites using easy-to-remember names instead of having to remember complex addresses.

DNS follows a hierarchical naming scheme that is supported by distributed database system to ensure no duplicate names are issued at all.

DNS allows users to easily navigate the web without needing to memorize complex addresses, which in turn makes internet usage more comfortable.

Working of DNS for identifying web addresses:

Steps for identifying web addresses:

1. First step is to enter a URL or equivalent Domain name as the address of the website that you want to access through the web browser.

2. The Web browser tries to resolve the IP address of the website by the information available in its own cache memory. If the IP address is not cached, the browser sends a request to a DNS servers. The DNS server tells the browser about the IP address of the website.

3. Once the web browser knows the IP address of the website, it then requests the web page from the web server.

4. The web server responds by sending back the requested web page. If the requested page does not exist then it will send back the appropriate error message.

5. Your web browser receives the page from the web server and displays it as per the display requirements of the web page.

For example, if we want to visit www.abc.ac.in , the following steps take place:

1. We first enter www.abc.ac.in in your browser.

2. The browser finds the IP address using DNS resolution.

3. It connects to the web server at that IP address.

4. The server sends the webpage data back to your browser.

5. The browser displays the webpage for you to see.

(h) What is a web browser ? Why is it needed ? Name at least three popular web browsers. 3

Ans: A Web browser is a software application that enables you to find, retrieve, and display information available on the World Wide Web (WWW). A web browser takes you anywhere on the internet. It retrieves information from other parts of the web and displays it on your desktop or mobile device. It provides an interface between the server and the client and it requests to the server for web documents and services.

Need for a web browser:

Browser also allows you to traverse information resources on the WWW. A web browser converts the HTML tags and their content into a formatted display of information. The information on the Web is organized and formatted using tags of a Markup language called Hypertext Markup Language or HTML. A web browser allows you to see the rich web contents from a website.

Popular web browsers:

Some of the popular web browsers are - Internet Explorer, Mozilla Firefox, Apple Safari, Google Chrome, and Opera.

2.

(a) Name and explain the purpose of any four utility programs used on a personal computer. 6

Ans:

i) Ans: Disk Checkers are used to check the integrity of the hard disk and Pen Drive/ Flash Drive. CHKDSK is a command which is used for this purpose. This command can be used on a computer running Windows operating system. It fixes the logical file system errors found in the disk/drive. It is a command line tools which is used to check the volumes for any potential errors. This command can be used to repair the problems related to bad sectors, lost clusters, directory errors etc.

We can run CHKDSK command from either My computer or windows explorer and from command prompt.

Once CHKDSK finishes the checking, it returns exit codes whose description is as My Personal Computer below:

Exit Code	Description
0	No errors found
1	Errors found and corrected
2	Disk cleanup was performed or disk cleanup was not performed because /f was not specified
3	Could not check the disk, errors could not be corrected or errors were not corrected because /f was not specified.

Running CHKDSK from My Computer :

* Double-click my computer and then right-click the disk drive you want to check.

* Click properties there and then click Tools.

* Under Error-checking, click Check Now button. It will open a dialog-box which shows Check disk options.

Running CHKDSK from Command Prompt:

- Click Start and then click Run.
- In Open type cmd and then press enter key, then use one of the following options:

* If you want to run CHKDSK in read-only mode, type CHKDSK at command prompt and press enter.

*If you want to repairs the error without scanning the volumes for bad sectors, type CHKDSK volume:/f at command prompt and press enter.

*If you want to repair errors, locate bad sectors, and recover readable information, type chkdsk volume:/r at command prompt and then press ENTER.

ii) Data Compression :

Data compression is the process of encoding, restructuring or otherwise modifying data in order to reduce its size. Data compression is the process in which information is encoded with lesser bits in compared to the original representation. Data compression is very useful, as it reduces the size of the file, so it consumes fewer resources like disk space. For this purpose, you can use zip/unzip utility.

Zipping a file creates the compressed version of the file which takes much less space than the original file. A zipped file has .zip file extension.

The main advantages of compression are reductions in storage space, data transmission time and communication bandwidth.

This can result in significant cost savings. Compressed files require significantly less storage capacity than uncompressed files, meaning a significant decrease in expenses for storage. A compressed file also requires less time for transfer while consuming less network bandwidth. This can also help with costs and increases productivity.

Text files are generally reduced more than the graphics file after compression. Similarly after zipping a file you need to unzip it, in order to view its contents or get it into its originalD form.

Steps to zip a file:

1. Right- click on any file you want to zip
2. Click WinZip from the shortcut menu
3. Click add to zip file
4. It will create .zip file

Steps to unzip file:

1. Right- click on any .zip file you want to unzip
2. Click Extract from the shortcut menu.

iii) Disk Management:

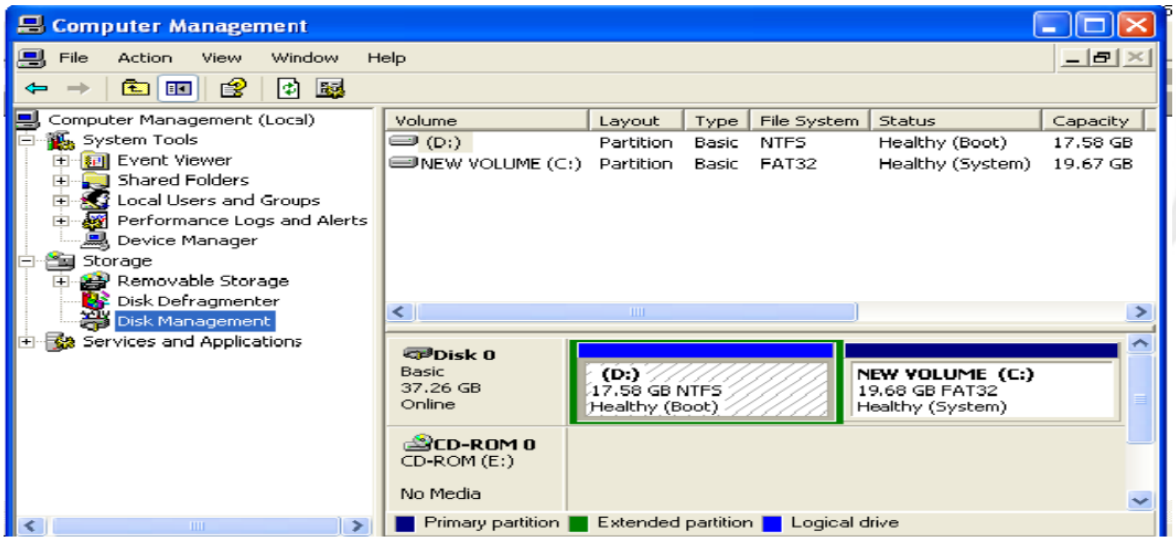
Disk Management is a tool used to manage system disks and their partitions locally or remotely. With disk management utility we can perform most disk related tasks such as initialization of disks, creation of volumes, formatting volumes, etc. it allows one to create fault-tolerant disk systems. Disk management is easy to use and its user interface and wizards allow us to carry out various disk related functions very efficiently.

How to open Disk Management:

1. Click My Computer, and then open Control Panel. Click Administrative Tools, and then double-click Computer Management.
2. In the console tree, click Storage and then click Disk Management.

You can also open Disk Management in following way :

1. Click Start, then click Run, type compmgmt.msc, and then click OK.
2. In the console tree, click Disk Management. The Disk Management window appears.



In Disk Management window, the upper section displays lists of all the partitions in the disk, and the bottom section contains the graphical representation of the drives in the computer.

iv) Disk defragmenter is a utility provided with windows operating system. It re-arranges the files stored on the disk so that it can occupy contiguous memory locations. This process is known as defragmentation.

It minimizes the head movements of the hard disk , in turn which reduces the time taken to read files from and write files to the disk. It increases the access speed. With this process files are stored in contiguous locations. The defragmenter reduces the fragmentation in the file systems. Fragmentation of the memory slows the performance of the system. Large number of files and some larger files contribute to fragmentation. When files are stored neatly it speeds up reading and writing to the disks. One should run defragmenter in the PC at regular intervals. It keeps the computer running quickly and efficiently.

Running Defragmenter

* Click Start button, select All Programs, click on Accessories click System Tools, and then click Disk Defragmenter.

* In the Disk Defragmenter dialog box, click the drives that you want to defragment and then click the Analyze button. After the disk is analyzed, a dialog box appears, letting you know whether you should defragment the analyzed drives.

*To defragment the selected drive or drives, click the Defragment button.

*After the defragmentation is complete, Disk Defragmenter displays the results.

* If you want to view the detailed report about the defragmented disk, click on View Report. The following are the main benefits of defragmenting a hard drive:

* It minimizes the head movements of the hard disk , in turn which reduces the time taken to read files from and write files to the disk. It increases the access speed.

* Files stay organised: Over time, adding and deleting files from a hard drive can make the data scattered, especially if it’s running low on storage space. Defragmentation organises the individual files, resulting in improved hard drive speed.

* Unused space is freed. Any unused space on a hard drive can be maximized by fragmentation. Sometimes, it can also create more usable space if bits of data are left over from deleted files.

* HDD life is extended: With regular defragmentation, the files on a hard drive stay organised. This means the mechanical and spinning components of a hard drive aren't used as extensively, which in turn extends the life span of a hard drive.

(b) What are the characteristics and advantages of a Local Area Network ? Explain any one ' LAN topology with the help of a diagram. 8

Ans: A local area network (LAN) is a collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.

Characteristics of LAN:

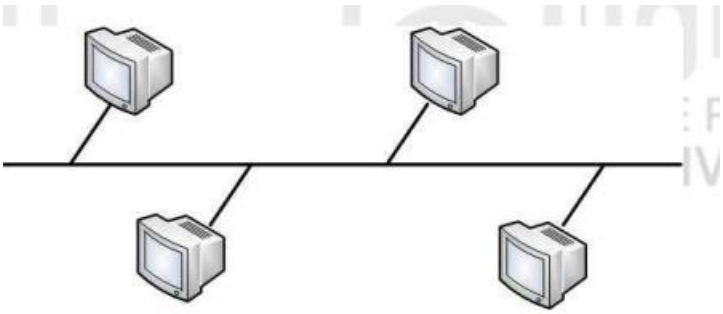
- It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.
- LANs are private networks, not subject to tariffs or other regulatory controls. For the Wireless LANs there are additional regulations in several countries.
- LANs operate at relatively high speed when compared to the typical WAN (.2 to 100 MB /sec).
- There are different types of Media Access Control methods in a LAN, the prominent ones are Bus based Ethernet, Token ring.
- LAN is a low-cost and effective network type capable of connecting multiple devices on a single transmission medium.
- Setting up a LAN network can be done at low costs. If there's a need for expansion, it can be done quickly.

Advantages of LAN:

- It allows sharing of expensive resources such as Laser printers, software and mass storage devices among a number of computers.
- LAN allows for high-speed exchange of essential information.
- It contributes to increased productivity. A LAN installation should be studied closely in the context of its proposed contribution to the long range interest of the organization.
- A LAN connection is relatively inexpensive to set up and maintain.
- The local nature of a LAN also makes troubleshooting quick and cost-effective.
- LAN is very adaptable. You can add or remove devices, move printers and computers to different areas of the building, and modify user information for existing devices with minimum hassle.

Bus topology:

All of the devices in a bus topology network are linked together by a single cable, which is referred to as a bus and the cable is known as backbone cable. It has a single length of cable with a terminator at each end as shown in the figure.



Bus topology

It is a passive topology which means only one computer at a time can send a message. Hence, the number of computers attached to a bus network can significantly affect the speed of the network. A computer must wait until the bus is free before it can transmit. Each node is connected to others nodes. The network operating system keeps track of a unique address of each node and manages the flow of data between machines.

The bus topology is the simplest and most widely used with local area network design. The computers on the bus keep on listening. When they hear data that belongs to them, they receive. When one device on the network wants to send a broadcast message to another device on the network, it first makes sure no one else on the bus is transmitting, and then it sends information out on the media. All other devices on the network see it, but only the intended recipient accepts and processes it. This is accomplished by using data frames which contain source and destination addresses.

It is simple, reliable, and easy to be used in a small sized local area network. It requires least amount of cable to connect computers together and is therefore less expensive than other cabling arrangements. If one computer on the bus fails, it does not affect the rest of the traffic on the bus.

In this topology, no two computers can transmit data at the same time. It does not cope well with heavy load which can slow down a bus considerably.

(c) Define the term "Open Source Software". Explain any two important features of the model used for open source software development. 6

Ans: Open Source Software is a computer software which is available along with the source code and software license that permits the code to be studied, modified and improved. It is often developed in public and collaborative manner. Open source development, follows the model of the bazaar. In an open source development model, roles are not clearly defined. The best features and functionality evolve into popular use much as good ideas evolve into popular use in the marketplace of ideas. Development is a collaborative process, resources are not scarce, and no one person or organization directs the project. The users are treated like co-developers and so they should have access to the source code of the software.

There are two competing definitions.

The Free software definition is based on the following four freedoms:

1. The freedom to run the program, for any purpose.

2. The freedom to study how the program works, and adapt it to your needs.

3. The freedom to redistribute copies so you can help your neighbor.

4. The freedom to improve the program, and release your improvements to the public, so that the whole community benefits.

The other definition is the Open source definition promulgated by OSI. This broader definition includes permissive software licenses.

The elements are:

- Free redistribution
- Source code available
- Derivative works permitted
- Integrity of the author's source
- No discrimination against persons or groups
- No discrimination against fields of endeavor
- Distribution of license with derivative works
- License must not be specific to a product
- License must not restrict use of other software
- License must be Technological-natural

Features of open source development model are:

* Users should be treated as co-developers. The users are treated like co-developers and so they should have access to the source code of the software.

* Early releases The first version of the software should be released as early as possible so as to increase one's chances of finding co-developers early.

* High modularization: The general structure of the software should be modular allowing for parallel development on independent components.

* Several versions: There should be at least two versions of the software. There should be a buggier version with more features and a more stable version with fewer features. The buggy version (also called the development version) is for users who want the immediate use of the latest features and are willing to accept the risk of using code that is not yet thoroughly tested. The users can then act as co-developers, reporting bugs and providing bug fixes.

* Dynamic decision making structure There is a need for a decision making structure, whether formal or informal, that makes strategic decisions depending on changing user requirements and other factors.

3.

(a) Explain the terms 6

(i) Simple batch systems and

(ii) time sharing systems in the context of operating systems. How are batch systems different than the multiprogramming system.

(i) Simple batch systems

Ans: Early machines were very expensive, and therefore it was important to maximize machine utilization. To improve utilization, the concept of batch operating system was developed. This is the most simple and basic batch OS. In simple batched system there is no direct interaction between the user and the computer. The central idea behind the batch processing system was the use of a piece of software known as the monitor. The user submitted the job on cards or tape to a computer operator, who batches the jobs together sequentially and places the entire batch on an input device, for use by the monitor. The system processes one job after the execution of another without human intervention. It will stop once all the jobs have been processed.

It includes the features of modern systems such as support for multiprocessing (with two identical CPUs) as well as multitasking capabilities.

IBM introduces OS/360 as the operating system for its new System/360 in 1964. OD/360 provided a powerful language to expedite batch processing known as Job Control Language. It introduced a simple form of multiprogramming or multitasking feature that

facilitated loading several jobs into main memory, so that other jobs programs could use the CPU when one job was busy with I/O. By this time, disks were also becoming available. To take its advantage the OS introduced features to cards onto disk while the CPU executed its jobs; thus, when a job completed, the OS could load another job from disk into memory, ready to run. This improved the OS scheduling capability. Multiprogramming or multitasking is the central theme of modern operating system.

Advantages of simple batch systems:

- Reduces the response time for the user.
- These systems improve the use of resources by processing jobs in groups and scheduling them during stages of resource accessibility.
- It can handle and complete a large number of tasks quickly.

Disadvantages of simple batch systems:

- It can solve only simple tasks. It cannot solve complex tasks. This can make them difficult to use for certain tasks like, managing files or software.
- It can be slow due to the fact that users need to wait for their turn to use the resources.

(ii) time sharing systems

Ans: It provide a mode in which the user interacts directly with the computer. This is required for jobs such as transaction processing. In time sharing system processor's time is shared among multiple users simultaneously. In time sharing system, multiple users simultaneously access the system through terminals, with the operating system interleaving the execution of each user program in a short burst or quantum of computation.

It allows the user to perform more than one task at a time, each task getting the same amount of time to execute. It is an extension of multiprogramming systems. All the tasks will run smoothly on the system. Hence, its name is also multitasking operating system. Multiple jobs are running at the CPU time and also, they use the CPU simultaneously.

Advantages of time sharing operating system:

- Response time of CPU reduces
- Idle time of CPU reduces
- Each task/ process gets an equal time slot to execute.
- User-friendly and simple to use.
- This type of operating system avoids duplication of software.

Disadvantages of Time Sharing Operating system:

- It uses a lot of resources.
- It has problem of reliability.

Batch system vs multiprogramming system:

Batch system	Multiprogramming system
Batch processing system is also called as Simple batch System.	Multiprogramming system is also called as multiprogram Task System.
A series of jobs are executed without any human intervention in Batch processing system. In this set of jobs with similar needs are batched together and inputted to the computer for execution.	Multiprogramming operating system allows to execute multiple processes by monitoring their process states and switching in between processes. It executes multiple programs to avoid CPU and memory underutilization.
Batch system is slower in processing than the multiprogramming system.	Multiprogramming system is faster in processing than batch processing system.
In batch processing system CPU needs to stand idle.	In multiprogramming system CPU must always complete a task.
It allows various applications to run simultaneously with little human intervention.	It allows various applications to run on a single processor system.
Processes have to wait in a queue.	Processes do not have to wait in a queue.

(b) Explain the different types of main memories that are part of a computer system. Why do you need secondary memories in a computer even if sufficient primary memory may be available ? 6

Ans: Main memory can be of various types like Random Access Memory (RAM) and Read Only Memory(ROM).

Random Access Memory(RAM):

The Read and write memory (R/W memory) of a computer is called a RAM. The user can write information into RAM and read information from it. It is called random access since any memory location can be accessed in a random manner for reading and writing. RAM is a volatile memory, which means, it is present as long as the computer is in the ON state, as soon as the computer turns off, the memory is erased.

RAM is really the main store and is the place where the programs and software we load gets stored. When the CPU runs a program, it fetches the program instructions from the

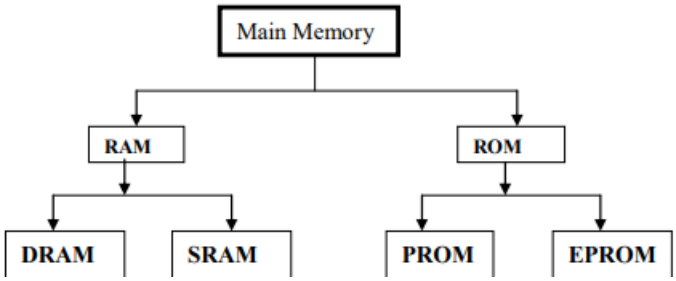
RAM and carries them out. Similarly, if the CPU needs to store the final results of calculations, it stores them in RAM. Thus, the CPU can both READ data from RAM and WRITE data into the RAM.

There are two important types of RAMs:

- Static RAM (or SRAM)
- Dynamic RAM (or DRAM)

Static RAMs retain stored information only as long as the power supply is on whereas a Dynamic RAM loses its stored information in a very short time (a few milliseconds) even though the power supply is on.

Dynamic RAMs are cheaper and consume less power whereas Static RAMs are costlier and consume more power. Static RAMs have a higher speed than dynamic RAMs.



Dynamic RAM is cheaper and so is used for main memory. Static Ram is faster and so is used in cache memory. Dynamic RAM requires the data to be refreshed periodically in order to retain the data while SRAM does not need to be refreshed. Six transistors are needed per memory cell in static RAM. Dynamic RAMs required fewer transistors per memory cell.

Read Only Memory(ROM): It is a non-volatile memory that is used to store important information which is used to operate the system. The information stored in it is not lost even if the power supply goes off. Thus a ROM is one in which information is stored permanently.

Information from ROM can only be read and it is not possible to write fresh information to it. That is, the CPU can only fetch or READ instructions from ROM. This is the reason why it is called ROM. ROM is much cheaper compared to RAMs. ROM is used for storing a special set of instruction, which the computer needs when it starts up.

Programmable ROM(PROM): It is a memory chip on which data can be written only once. Once a program has been composed onto a PROM, it remains there until the end of time. Once a program has been written on to a PROM chip, the recorded information cannot be

changed i.e., the PROM becomes a ROM and it is only possible to read the stored information. PROM is a non-volatile memory i.e. the stored information remains even if power is switched off.

Erasable Programmable ROM: It is a memory chip that is non-volatile in nature that is it can hold the data even after the power supply is stopped. It can be reused again and again as it is easily programmable and erasable.

Need for secondary storage:

- The primary reason computers need secondary storage is to preserve data even when the power is turned off. This is crucial for the longevity and accessibility of files. Unlike RAM, which loses its contents when not powered, secondary storage devices like hard drives and flash drives retain information indefinitely. This allows us to store irreplaceable documents, photos, music, and other crucial data without the risk of losing it.
- It offers a much larger storage space than the computers primary memory (RAM), accommodating extensive data and complex software.
- It plays a crucial role in backing up your data and recovering it in case of data loss or system failure.

(c) Name the features of any eight devices used for input/output. 8

Ans: Input and output devices allow the computer system to interact with the outside world by moving data into and out of the computer system.

Examples of some input devices are:

* Keyboard

* Mouse

*Joystick

* Microphone

* Bar code reader

* Graphics tablet

* Pen drive

* CD/DVD

* Digital Camera

An output device is used to send data out of the system. s. Examples of some output devices are:

* Monitor

* Printer

* Plotter

* Speaker

Keyboard: It is the most common input device used for entering data and information into the computer system. This is the standard input device attached to all computers. The keyboard is a primary device for inputting text by pressing a set of keys. The layout of keyboard is just like the traditional typewriter of the type QWERTY. Keyboard devices can be classified into two types general purpose keyboards and special purpose keyboards. General purpose keyboard are standard keyboards used with most computer system. They are called general purpose because that have enough keys to make them useful for any type of application.

Mouse : A Mouse is a handy device which can be moved on a smooth surface to cause the movement of a cursor on the screen. It is a pointing device which is used to input data and information into the computer system by pointing on it. A mouse contains a small case, held under one of the user's hands with one or more buttons. For GUI-based systems a mouse is an essential pointing-device. The cursor of the mouse moves in the same direction in which the mouse ball rolls. Different types of mouse are: mechanical mouse, optical mouse, cordless mouse.

Trackball: Trackball is a moveable ball mounted on a stationary device, which can be rotated manually by using fingers. It is also a pointing device. In a trackball, the ball is placed on the top along with buttons which can be rolled with the fingers. These are used in playing video games. Mouse and mobile phones are equipped with trackballs to navigate addresses as well as play games.

Joystick: Joystick is a remote control device for a computer which is used for playing video games to indicate the position. It has a stick that pivots on a base and is used for controlling the action in video games. The User moves a spherical ball with the help of a stick in the joystick as opposed to the trackball where fingers are used for moving the ball. Joysticks are also used for controlling machines such as cranes, trucks, underwater unmanned vehicles, flight simulators, industrial robots etc.

Plotters: A Plotter is a device that draws pictures on a page as output, after receiving a print command from the computer. It is also called a graph plotter. In plotters pens are used to draw lines on the paper, which is placed in the plotter. Plotters produce high quality diagrams on the paper and their output quality is good. Engineers, architects and planners use plotters to generate high quality, high-precision graphic output of different sizes. For several design applications such as design of layout of an aircraft, car, and architectural design of a building and in other computer-aided design applications plotter are very useful. Plotter is of two types:

- Drum Plotter
- Flat-Bed Plotter

Speaker: Computer speakers, or multimedia speakers, are external speakers, commonly equipped with a low-power internal amplifier which produces sound as output. External speakers are connected to a computer by using a plug and socket. Computer speakers range widely in quality and in price. Laptop computers have inbuilt speakers.

Microphone: A Microphone is an acoustic-to-electric transducer or sensor and is used to convert sound signals into electrical signals. It was originally invented by Emile Berliner in 1877, and allows you to record voices or sounds and place them onto computers, generally as a wave file. To connect a microphone we insert the plug of it into the back of the computer system. Integrated microphones can be found on laptops and some desktop monitors. These microphones are usually a small hole in front of the computer which when spoken into, will record your voice.

Bar Code Reader: A barcode reader is an electronic device which is used to read printed barcodes. Barcodes represent alphanumeric data which is a combination of vertical lines (bars) that vary in width and length. It is a fast and effective way to input data. A Barcode reader uses a laser beam to read the series of thick and thin lines which represent the bar code number. The bar code is 13 digits long and it has four main divisions. The First two digits of a bar code represent the country, the second part represents the manufacturer's code (five digits) the third part represents the product code (five digits) and the last digit is a check digit.

4.

(a) What are different types of optical disks ? Explain their features and give their advantages. 8

Ans: Different types of optical disks are:

1. CD-ROM (Compact-Disk Read Only Memory)

2. WORM (Write Once Read many) or CD-R (CD-Recordable).

3. Erasable Optical Disk

4. DVD-ROM, DVD-R and DVD-RAM

Features of CD-ROM: CD-ROM technology uses 12-centimeter (4.7-inch) compact disks (CDs) similar to those used in stereo music systems. Each disk can store more than 600 MB. That is approximately equivalent to 400 1.44 MB floppy disks or 300,000 double-spaced pages of text.

First of all a master disk is prepared. On a master disk, a laser records data by burning permanent microscopic pits in a spiral track to represent 1. From a master disk, CDROMs are produced on mass scale. Then CD-ROM disk drives use a laser device to read the binary codes formed by those pits.

For reading the data a laser beam of lower intensity is employed. A laser system needs 25mW for writing whereas only 5mW are needed for reading.

CD-ROMs use long spiral tracks to store data serially, as shown in Figure 3.15. The track is divided into blocks of same size as shown in the figure. A CD-ROM disk rotates at a variable speed so that the pits are read by the laser at a constant linear speed. The speed of the disk is adjusted in such a way that the track passes under the read/write head at a constant linear velocity.

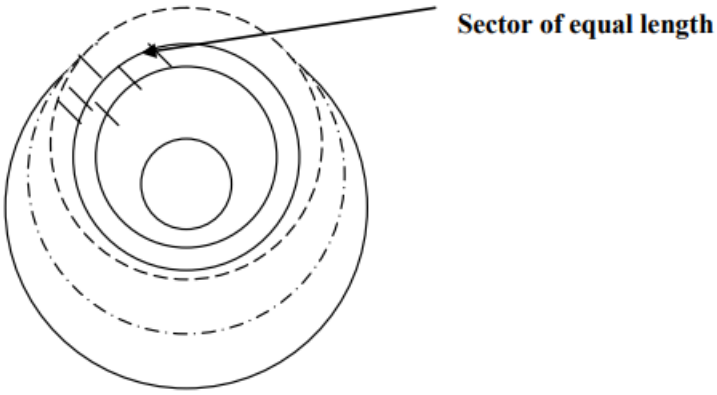


Figure 3.15: A CD-ROM disk layout

Advantages of CD-ROM:

* High storage capacity.

* Cost per bit of storage is cheaper than the other types of memory devices.

* Removable from the computer, so suitable for archival storage. 5.25 inch disks store 650 MB data.

Features of WORM or CD-R:

CD-R (compact-disk recordable) is another optical disk technology. The user can record (write) their own data once on a CD with a CD-R disk drive unit. After this recording user can read the data as many times as desired.

CD-R is suitable for data and files which are not to be changed. The user can store permanent data, information, and files for maintaining records.

Advantages of WORM or CD-R:

*High storage capacity.

*Better reliability and long life.

Features of Erasable Optical disk or CD-RW (CD-rewritable):

CD-RW (CD-rewritable) optical disk systems have now become available which record and erase data by using a laser to heat a microscopic point on the disk's surface.

Advantages of CD-RW:

* Very high storage capacity. A 5.25 inch optical disk can store about 650 MB data

* Optical disk can store about 650 MB data

* It can be erased and reused.

Features of DVD-ROM, DVD-R and DVD-RAM:

DVD stands for Digital Video Disks or Digital Versatile Disks. A DVD stores much more data than a CD-ROM. Its capacities are 4.7GB, 8.5GB, and 20GB etc. The capacity depends on whether it is a single layer, double layer; single sided or double sided disk. DVD uses laser beam of shorter wavelength than CD-ROM uses and therefore more tracks are available. Working principles of DVD disks are same as those of a CD-ROM, CD-R or CD-RW.

DVD-R: It is a recordable DVD, same as a CD-R disk. The user can write data once on a DVD-R, then read the data as many times as required.

DVD-RAM: It is a rewritable DVD, same as a CD-RW disk. DVD-RAM uses a phase change technology to write, read and erase data.

Advantages of DVD-ROM, DVD-R and DVD-RAM:

- Large storage capacity
- Can be used in certain models of DVD players.
- Some types can be reused or rewritable.

(b) Explain at least four important features of the following application software. (i) Word Processing (ii) Spreadsheet (iii) Database 12

(i) Word Processing

Ans: Few features of word processing are:

- Adding Header, Footer or Page Number to a Document

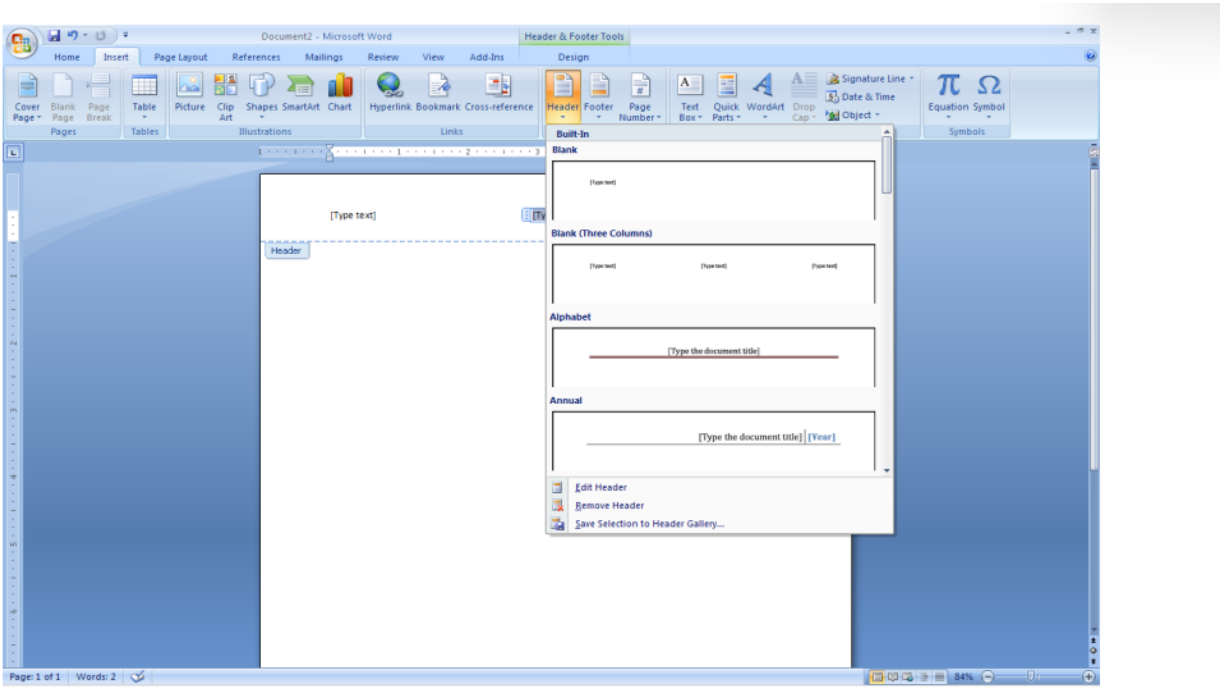
To add a graphic or text on the top or bottom of a document, a Header or Footer has to be added.

1. Click on Insert Tab, select the Header or Footer or Page Number from Header & Footer group.

2. You can select from the available gallery and choose the design required.

3. After selection, the same design chosen will appear in the document.

To add a customized design for the Header or Footer, double click on the Header or Footer area in the document. The same is opened in the design mode. After making the required changes to the design, close the Header/Footer area.



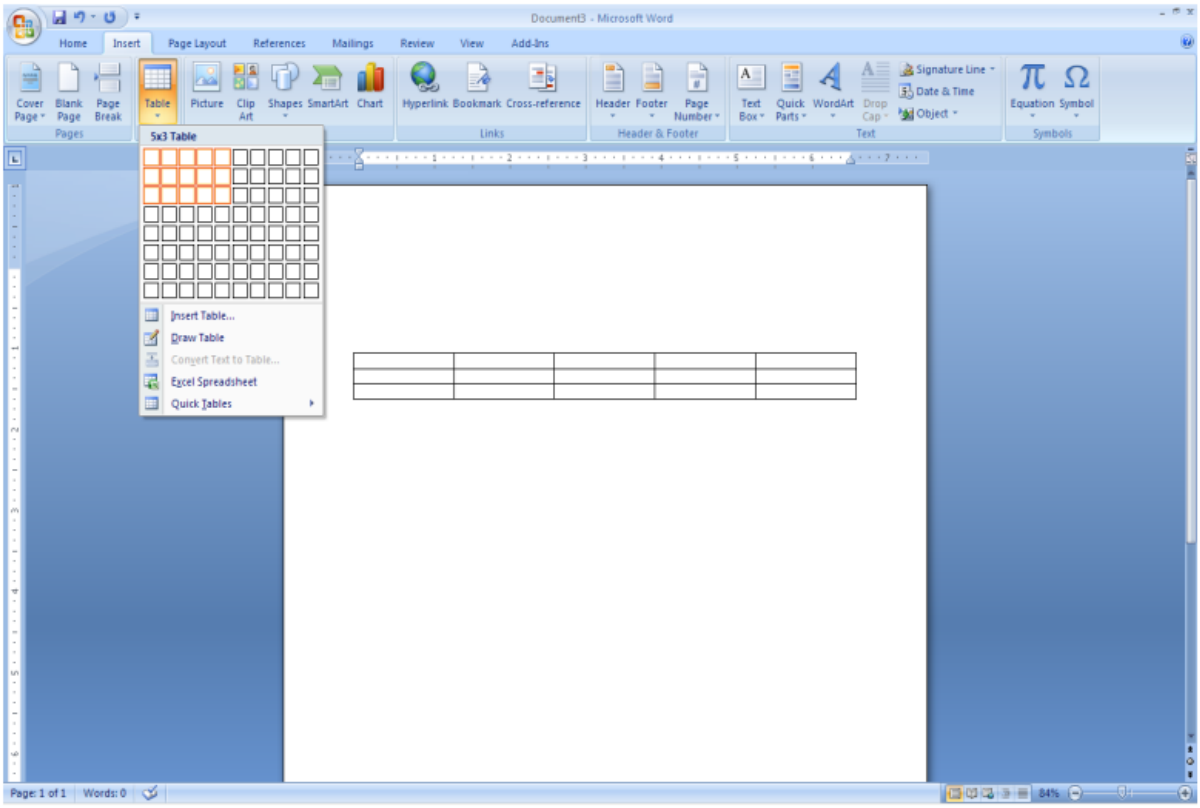
- Creating a table in word :

To insert a simple table with required number of row and columns:

1. Click in the document where the table has to be inserted.

2. On the Insert tab, in the Tables group click Table, and then under Insert Table, select the number of rows and columns required in the table.

3. The table will be drawn on the document.



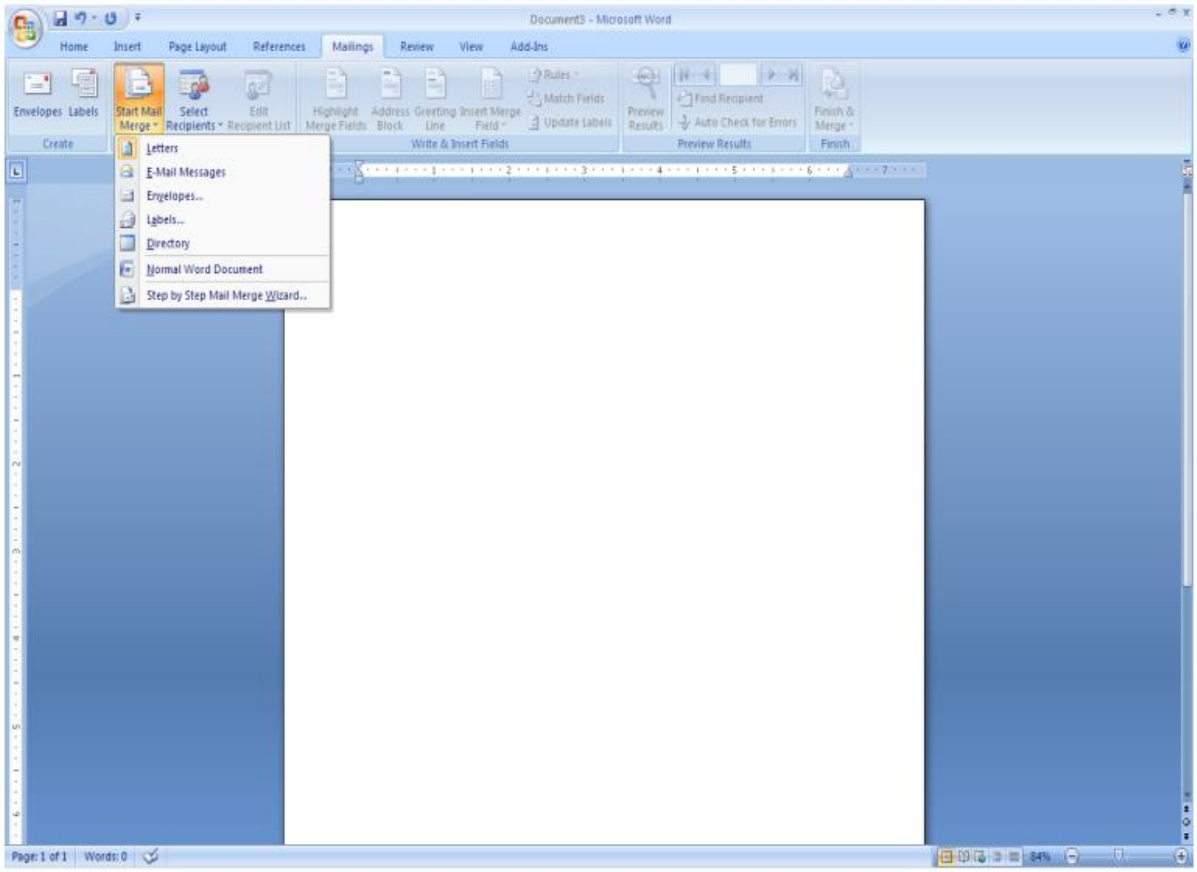
- Creating a memo for multiple recipients-mail merge

Mail merge is a software function describing the production of multiple (and potentially large numbers of) documents from a single template form and a structured data source. This helps to create personalized letters and pre-addressed envelopes or mailing labels for mass mailings from a word processing document which contains fixed text, which will be the same in each output document, and variables, which act as placeholders that are replaced by text from the data source. The data source is typically a spreadsheet or a database which has a field or column matching each variable in the template.

The mail merge process entails the following overall steps:

1. Set up the main document. The main document contains the text and graphics that are the same for each version of the merged document. For example, the return address or salutation in a form letter.

2. Connect the document to a data source. A data source is a file that contains the information to be merged into a document. For example, the names and addresses of the recipients of a letter.



3. Refine the list of recipients or items. Microsoft Office Word generates a copy of the main document for each item, or record, in your data file. If your data file is a mailing list, these items are probably recipients of your mailing. If you want to generate copies for only certain items in your data file, you can choose which items (records) to include.

4. Add placeholders, called mail merge fields, to the document. When you perform the mail merge, the mail merge fields are filled with information from your data file.

5. Preview and complete the merge. You can preview each copy of the document before you print the whole set.

- Creating a table of contents

Table of Contents (TOC) is created by applying heading styles to the text that is to be included in the TOC. Word will search for those headings and create the TOC in the document. The Table of Contents can be selected from design gallery provided in word.

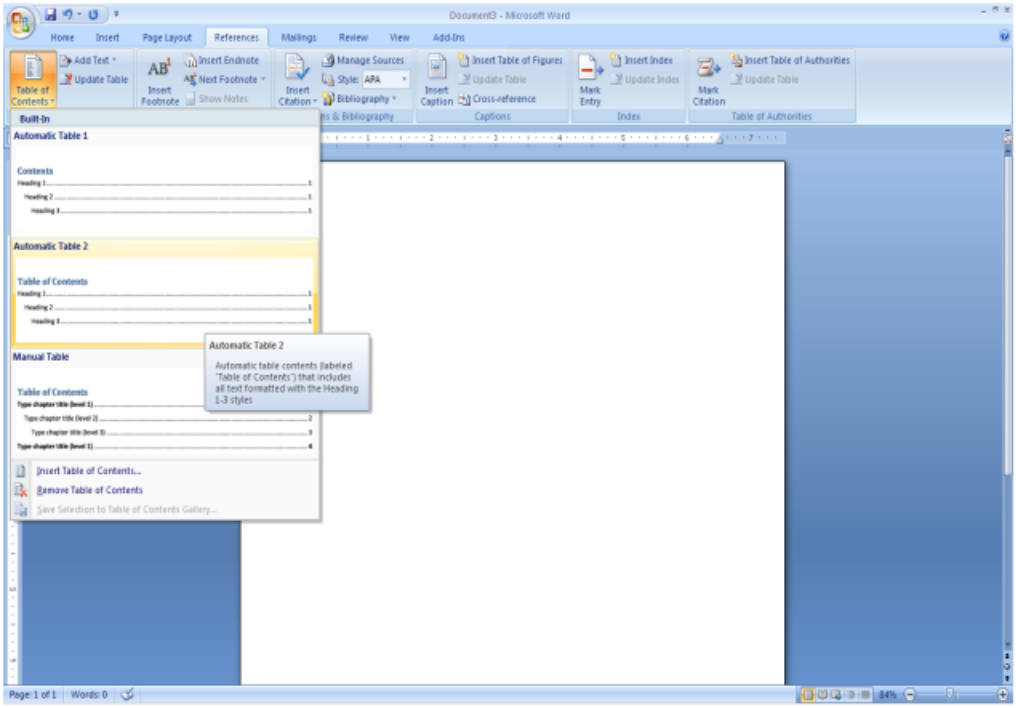
1. Select the text that is to be appear in the TOC

2. On the Home tab, in the Styles group, click the Style (Heading1, Heading2....) that you want to choose.

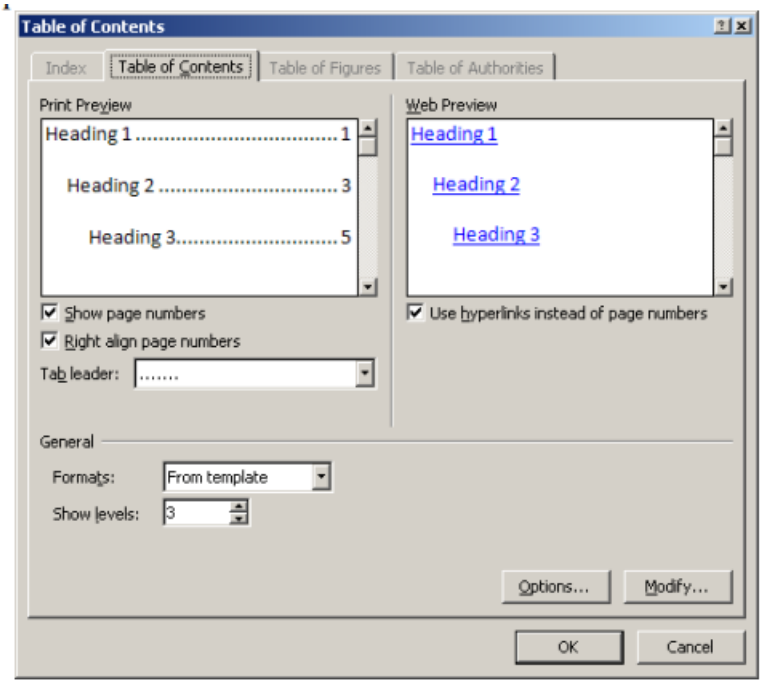
3. Click the place in the document where the TOC has to be inserted.

4. ON the Reference Tab, click Table of Contents on the Table of Contents group

5. Choose the TOC Style that is required



In order to create a customized Table of Contents, ON the Reference Tab, click Table of Contents on the Table of Contents group and choose the Insert Table of Contents option.



(ii) Spreadsheet

Ans: Few features of spreadsheets are:

* Cells and Grinds: Spreadsheets are made up of cells organized in rows and columns. Each cell can hold data such as numbers, text, or formulas.

* Formulae and function: Spreadsheets allow users to perform calculations using formulas. Formulas can be simple addition or complex functions involving multiple cells. Spreadsheets come with built-in functions for SUM, AVERAGE and COUNT. These functions can automate data analysis and calculations. There are different categories of functions that can be incorporated in the sheets like Date & Time, Mathematical, Statistical, Logical, Text functions etc.

The different categories of functions are:

Date and Time:

MONTH - Converts a serial number to a month

NOW - Returns the serial number of the current date and time

Math and Statistical:

SUM – Adds its arguments

COUNTIF - Counts the number of cells within a range that meet the given criteria

Logical:

IF - Specifies a logical test to perform

AND - Returns TRUE if all of its arguments are TRUE

* Charts and Graphs: Spreadsheets have charting and graphing tools that allow users to create visual representations of data such as bar graphs, pie chart etc.

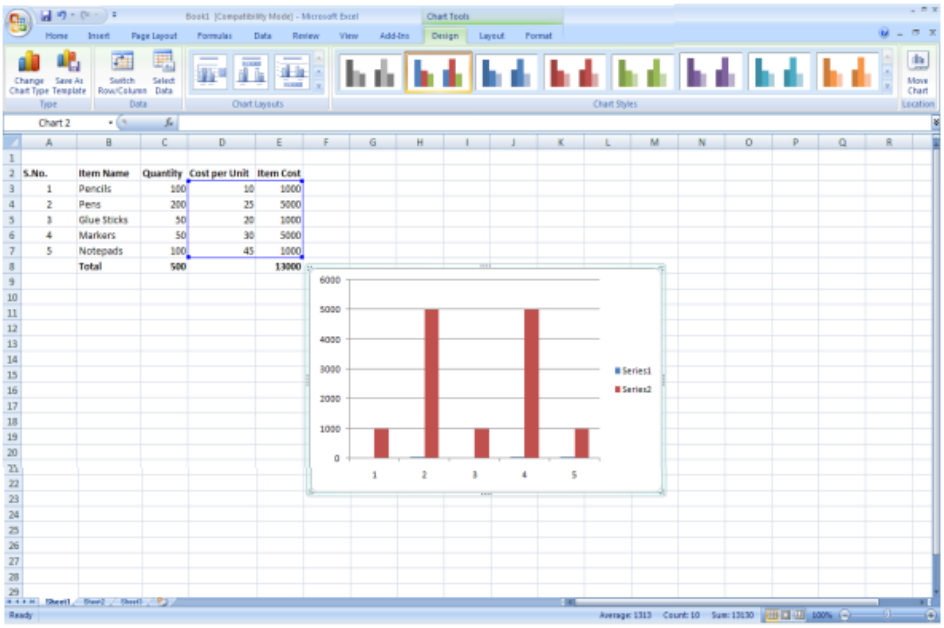
Charts and Graphs can be created based on data in the sheets. To create a chart to represent data graphically:

1. Select the data

2. Go to Insert

3. Select the chart type from the options available like Bar, Line, Pie, Scatter etc.

4. The chart will get automatically populated with the selected data on which the chart is to be based.



*Macros

A macro is a short program written using VBA that can be used to carry out a specific task. VBA is the language that Excel macros are written in. It is a programming language that is included with all of the Microsoft Office applications e.g. Word, Access, Power Point, Excel as well as others.

The Macro has to be recorded as follows:

1. Go to the Tools menu, go to —”macro” and then —”Record New Macro”

2. Assign a name to your macro if you'd like, as well as type a short description.

3. You can also assign a keyboard shortcut to it (so you can press a sequence of keys to run the macro).

4. Now click on OK. You'll be returned to Excel.

5. Simply perform the actions you want the macro to do.

6. Once you're done recording your macro, press the Stop button which should now be visible on your screen.

Once the Macro is recorded it can be executed in the following ways:

1. Run a macro by using the menu command

2. By pressing a CTRL combination shortcut key

3. Clicking a toolbar button or an area on an object, graphic, or control

4. Run a macro automatically when the workbook is opened.

(iii) Database

Ans: 1. Table: A Table is a database object that is used to store data about a particular subject like employees, students or products. In a Table, the columns are called fields or attributes and the individual records are called Tuples (rows).

Creating table in database:

1. Click the Microsoft Office Button, and then click New.

2. In the File Name box, type a file name for the new database.

3. To browse to a different location to save the database, click the folder icon.

4. Click Create.

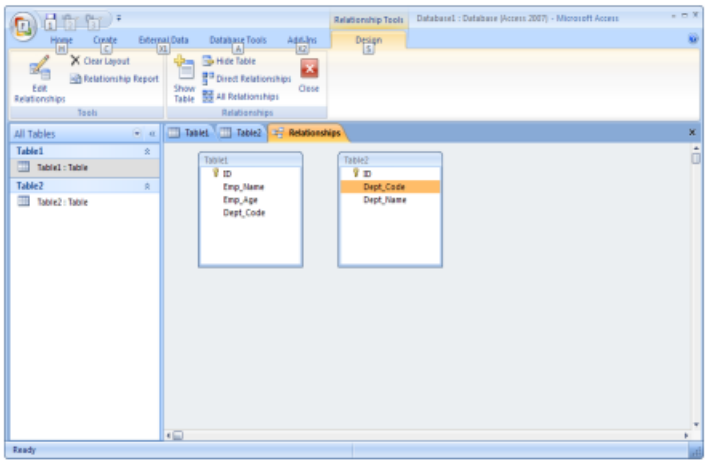
The new database opens, and a new table named Table1 is created and opens in Datasheet view.

2. Defining relationships: When you create a relationship between tables, the common fields are not required to have the same names, but the common fields must have the same data type. If the primary key field is an AutoNumber field, however, the foreign key field can also be a Number field if the FieldSize property of both fields is the same.

To create relationships between two tables,

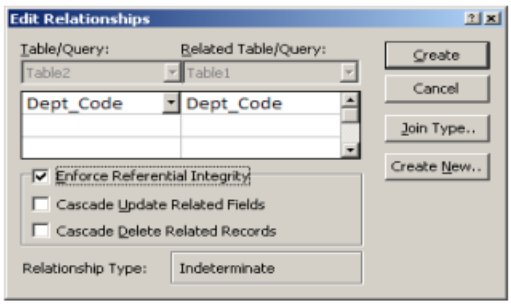
1. Choose Relationships under the Database Tools menu.

2. Then Choose the Table option and add the tables between which relationship has to be created.



3. Drag a field (typically the primary key) from one table to the common field (the foreign key) in the other table. To drag multiple fields, press the CTRL key, click each field, and then drag them.

4. The Edit Relationships dialog box appears as below:



5. To enforce referential integrity for this relationship, select the Enforce Referential Integrity check box.

6. Click Create.

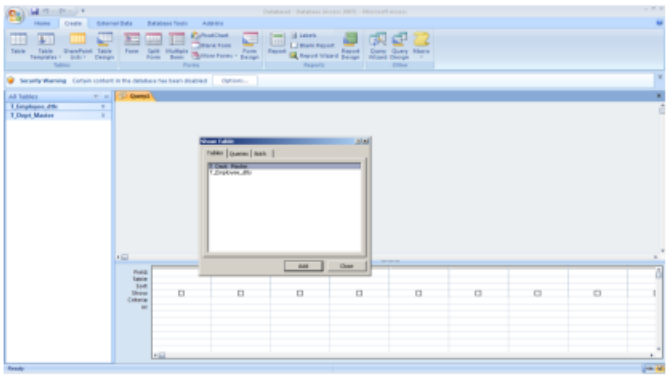
Access draws a relationship line between the two tables.

3. Defining queries: When data has to be reviewed, added, changed or deleted from the database, a query is used. Queries are also used to answer very specific questions about

the data that would be difficult to answer directly by just looking at the table data. Queries can be used to perform calculations on the data, to filter data and to summarize the data.

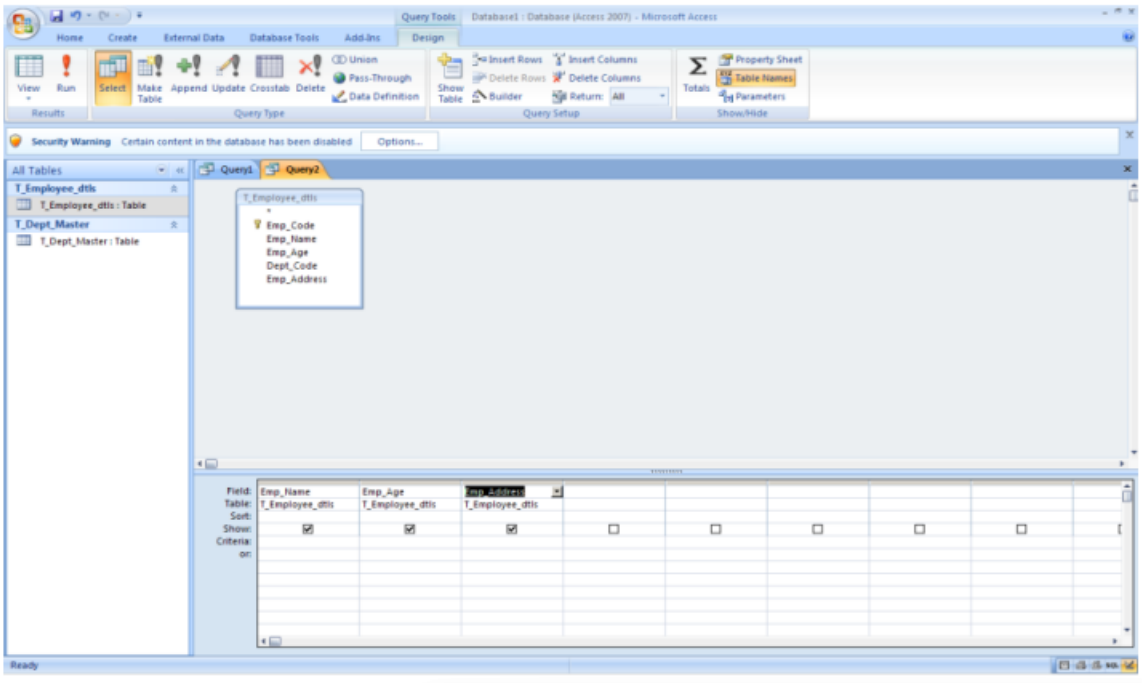
1. On the Create tab, in the query group, click query design. A show Table dialog box appears.

2. In the Show Table dialog box, choose the table on which query has to be based and close the show Table dialog box.

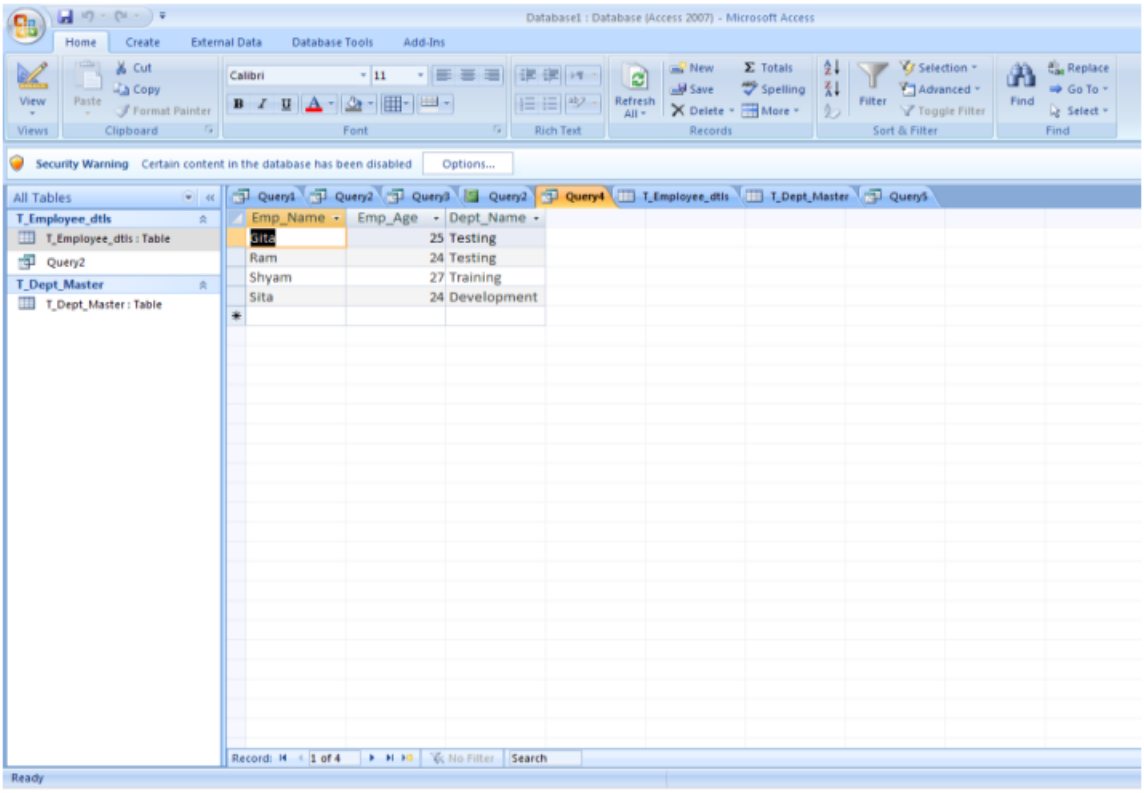


3. In the selected Table, double click the fields that have to be added to the query

4. On the Design Tab, in the Results group, click Run.



The query will be executed and the result is displayed in the grid as shown below



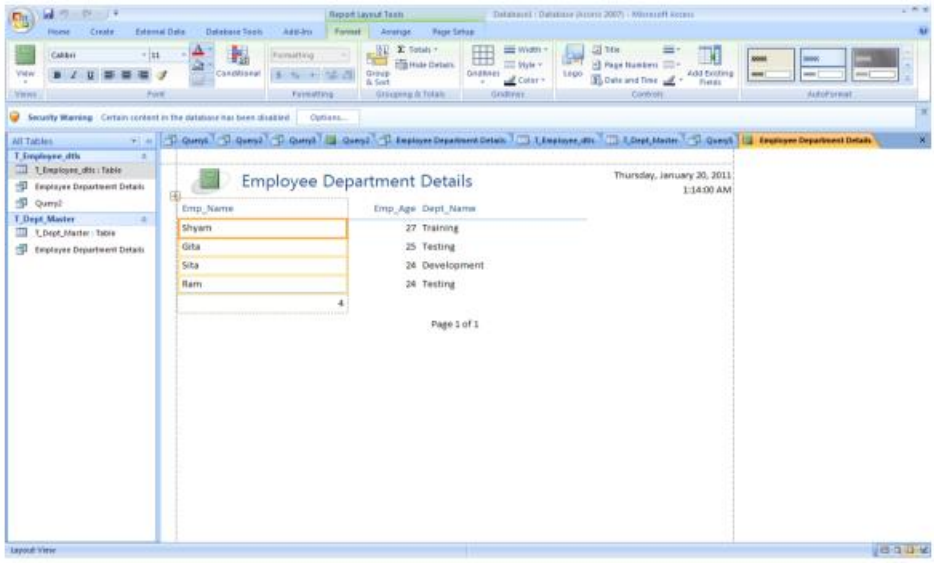
4. Report:

A Report consists of information from tables and queries that is stored with a particular report design such as labels, headings and graphics.

1. In the Navigation pane, select the query or Table on which the report has to be based.

2. On the Create Tab, in the Reports group, click Report

3. The Report will be created and displayed



Once the report is created, its layout can be modified in the Report design view.

5.

(a) Collaboration in the context of internet.

Ans: Collaboration is defined as an act or process of working together on a project or some intellectual activity. Collaboration involves both communication and sharing of ideas. Some of the important areas where collaboration is useful are physical science, high-energy physics, Health Science, environmental studies etc.

The collaboration helps in sharing of resources. These resources may be your intellectual efforts, hardware computing power or any other form of activity. Collaboration helps in solving complex problem domains by distributing the problems.

Most of the tools used on the internet can be used for some form of collaboration. For example, google docs is one such tool that may enable you to create a collaborative project report online. One can create a document using it and share it with your colleagues who in turn may be able to add content to it from anywhere, edit it and discuss about it using a discussion group.

Another software that can be used for collaboration is Google Wave. It allows you a shared web space for discussion or working together in a group. You may use text, photographs, maps etc. for this purpose. This software also combines collaboration with email, chat, messaging etc.

Other web-based collaboration tools are:

Zoho: Zoho is a division of ZOHO Corporation, a US-based Software Company. Zoho is a very good site for collaboration. It not only allows simple mundane tasks like group editing, document sharing, group chat, etc. but also provides some management tasks like milestone tracking, invoice creation, and other team tasks.

Volunteer Computing: It allows r hardware resources to be used for the purpose of some online project.

(b) Blog in the context of internet.

Ans: Blog is a website where entries are written as information or news on a particular subject. A blog may combine text, images, or other media components; however, most blogs are textual. They may also provide links to other web pages or blogs. In addition, blog allows you to leave comments in an interactive format. Blogging is emerging as wonderful way to share and publish your views.

A blog need not be restricted to a single author; it can merge different kinds of ideas

Some of the types of blogs that are currently in use on Internet are:

- Corporate and organizational blogs – may be used for projecting organizational culture and market branding.
- Category based blogs – blogs on particular subject like travel, health, environment, music, education and many other.
- Blogs having different media and device types – a blog having only videos may be called vlog, having only links may be called linklog, there are many such categories, a log for mobile devices may be called moblog. The collective community of blogs is known as the blogoshere.

Starting a blog:

1. Select a good blogging service provider. Some of the present blogging service providers are LiveJournal, Blogger, Wordpress.com, Xanga, Tumblr and webs. Most of these services provide templates for creating and publishing blogs.
2. Next step is to make a blog public or private based on your requirements. A private blog may be password protected.
3. Make a few sample postings and test your blog for the look and feel. After completing the blog, publish the URL of your blog on your website.
4. Visit and leave comments on other blogs leaving your blog address so that they can also make a visit to your blog.

5. Update your blog frequently so that when people return, they have something new to read.

Issues while blogging:

- Blogging may result in some unforeseen consequences including legal liabilities, therefore, you should be very careful while blogging.
- You should never release any confidential information about you or any other person or organization.
- Do not use any defamatory language against anybody in a blog.
- Do not discuss office matters through blogs.
- Be very careful of the language you are using on the blog, it should not be offending, aggressive or abusive.

(c) TCP/IP:

Ans: TCP and IP (TCP/IP) are the two core protocols of the Internet Protocol suite. The TCP primarily provides the reliable delivery of stream of bytes from a computer or a program to another computer or a program. It breaks the data stream into packets at the source and makes sure that all the packets are assembled orderly at the destination. The IP protocol on the other hand identifies the location of source and the destination. Any computer on Internet is identified by its unique IP address. Currently two standard versions of IP are available viz. Internet Protocol Version 4 (IPv4) which is currently being used on most of the Internet. An IPv4 address is a 32 bit address.

Using the TCP/IP as the basic protocol Internet offers many services and application to its users like work wide web, Email, Chat, Social networking, collaboration etc.

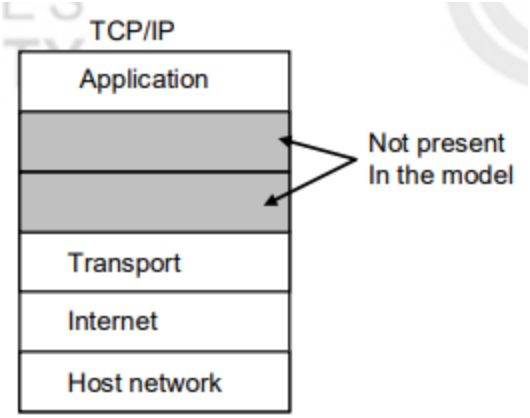
TCP/IP was originally designed for the UNIX operating system; however, TCP/IP software is now available for every major operating system. In order to be compatible to the Internet, the computer must have TCP/IP compatible software. The major advantage of Internet is information sharing. Since in computers, bits and bytes are basic building blocks of information. Thus, one of the key aspects in network of many computers is to move bits between two specific computers. For such a communication, we require the address of the destination and a safe mean of moving data in the form of electronic signals. As far as safe movement of data is concerned, there exists a set of rules, which governs the sending, and receiving of data on the Internet.

A stack of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol) implements these rules. Its name reflects names of only two protocols called TCP and IP.

For sending large block of text/data to another machine, TCP divides the data into little data packets. It also adds special information e.g., the packet position, error correction code etc. to make sure that packets at the destination can be reassembled correctly and without any damage to data. The role of IP here is to put destination addressing information on such packets. On Internet, it is not necessary that all the packets will follow the same path from source to destination. A router tries to load balance various paths that exist on networks. Other gateways allow different electronic networks to talk to Internet that uses TCP/IP.

The Internet layer is an important layer in the protocol suite. At this layer, TCP/IP supports Internet Protocol (IP). This layer is responsible for the format of datagram or a packet as defined by IP and routing and forwarding a datagram or packet to the next hop (hop is a term that can be used to represent any computing device on Internet like; router, gateway, computer etc. A hop is the trip from one device to the next.) The primary goal of the Internet is to provide an abstract view of the complexities involved in it. Internet must appear as single network of computers. At the same time network administrators or users must be free to choose hardware or various internetworking technologies like Ethernet, Token ring etc. Different networking technologies have different physical addressing mechanisms. Therefore, identifying a computer on Internet is a challenge. To have uniform addressing for computers over the Internet, IP defines an IP address, which is a logical address. IP address is a 32 bits number, can be represented in decimal e.g., 192.168.32.10. Now, when a computer wants to communicate with another computer on the Internet, it can use logical address and is not bothered with the physical address of the destination and hence the format and size of data packet. IP address is a basic address used by the lower architecture of Internet. It is important for you to know that, any address you type as web address or email address actually gets converted into the equivalent IP address of a machine or computer where the server or resource is available. Web address or email addresses are used for ease and convenience of human beings otherwise; it is just a burden for network.

The TCP/IP model has many layers which are described below:



Host to Host Network:

In fact TCP/IP model does not specify this layer. But it basically combines functionality of physical and data link layers. Starting at the bottom, the Physical layer is what deals with hardware (wires, cables, satellite links, NICs, etc.). Utilizing the existing Physical layer, TCP/IP does not define its own, thus letting the layer be compatible with all network suites. This layer also encodes and transmits data over network communications media in the form of bits which are received by the Physical layer of the destination device. Often combined with this layer is the Data link layer which is responsible for moving packets from the network layer onto different hosts. Depending on the connection type, IP packets are transmitted using various methods. Dial-up modems transmit IP packets using PPP(Point-to-Point Protocol)while broadband users transmit using PPoE.(Point-to-Point Protocol over Ethernet).

Internet Layer: This layer routes and delivers data across similar networks or completely different networks. The Network layer is responsible for end to end packet delivery while maintaining routing, flow control, and error control functions. An example of this layer is the Internet Protocol (IP) or the Internet Protocol Security (IPSec).

Transport Layer: The Network layer can be thought of the actual vehicle which transports information. This layer categorizes end to end message transmissions or connecting applications as either Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). TCP is a connection-oriented protocol which is considered to provide a reliable byte stream. Some characteristics of TCP are traffic congestion control, data arrives in order, data has minimal error, and duplicate data is discarded.

The top layer of the TCP/IP model is the Application layer which is used for network communication. Ports are used by programs to transfer data through this layer. For example, the File Transfer Protocol uses port 21 by default while the Hypertext Transfer Protocol uses port 80.

TCP/IP has many benefits. TCP/IP enables cross-platform networking which is useful in this day-in-age. This suite also has superior failure recovery and the ability to add networks without interrupting existing services. The reliability of TCP/IP is also a huge benefit to using this protocol. The fact that if one part of the network goes down, other parts are still able to function is what has set TCP/IP above other networking protocols. TCP/IP is also easily expandable which allows for the unprecedented rate of growth which the Internet possesses.

(d) Router and Switches

Ans:

Router: A router is a networking device that forwards data packets between computer networks. A router translates information from one network to another. Router selects the best path to route a message, based on the destination address and origin. The router can direct traffic to prevent head-on collisions, and is smart enough to know when to direct traffic along shortcuts. Routers can even —listen to the entire network to determine which sections are busiest—they can then redirect data around those sections until they are removed.

If you have a LAN that you want to connect to the internet, you will need to purchase a router. the router serves as the translator between the information on your LAN and the internet. It also determines the best route to send the data over the internet. Routers maintain a map of the physical networks on a Internet (network) and forward data received from one physical network to other physical networks. The router is mainly a Network Layer device.

A router operates on the Network layer of the OSI model. It allows the users to connect several LAN and WAN. A router is more capable as compared to other network devices such as hub, switch etc. , as the router has the capability to analyze and modify the data while transferring it over a network, and it can send it to another network.

Advantages:

- Router provides the security, as LANs work in broadcast mode. The information is transmitted over the network and traverses the entire cable system. Although the data is available to each station, but the station which is specifically addressed reads the data.
- Routers provide reliability. If one network gets down when the server has stooped, or there is a defect in the cable, then the router services and other networks will not be affected.
- Routers are relatively easy to set up and manage.

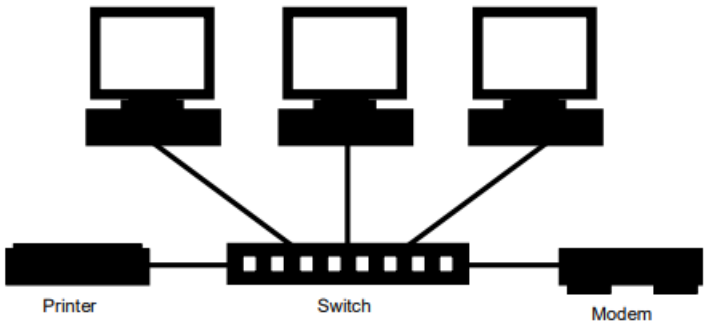
Disadvantages:

- One of the main disadvantages of routers is that they may have limited bandwidth. This means that the amount of data that can be transmitted over a network is limited, which can cause delays and slowdowns.
- Routers can be expensive.
- Routers also have a limited range, which means that the signal strength decreases as the distance from the router increases. This can cause connectivity issues.

Switches: A switch is also known as switching hub. It is a device that can segment a larger local area network to reduce the traffic load. A network switch connects devices in a network to each other, enabling them to exchange data packets. It is responsible for filtering and forwarding the packets between LAN segments based on MAC address.

One should implement a switch when you have a network with 20 or more users that have bogged down the network by excess traffic. It splits the network into two or more segments with devices that normally talk with each other. Conceptually – switching takes data from one interface and delivers it to another interface. A switch operates on the data-link layer of the OSI model.

A switch has many ports, to which computers are plugged in. When a data frame arrives at any port of a network switch, it examines the destination address, performs necessary checks and sends the frame to the corresponding device(s).



Advantages:

* Prevents traffic overloading in a network by segmenting the network into smaller subnets.

* It increases the available bandwidth of the network.

* It enhances the performance of the network.

Disadvantage:

- They are pretty expensive.
- Proper design and configuration are needed.
- Network connectivity issues are difficult to be traced through network switch.

(e) User interfaces of operating systems

Ans: A user interface is a program or suite of programs that allows a user to interact with a computer in many ways. User interfaces allow users to:

- Copy, delete, move, sort, rename and search for files or folders
- Multitask by having more than one application open
- Switch between tasks
- Customize the interface, for example by changing the background color or layout

The user and operating system are connected with each other with the help of interface, so interface is used to connect the user and OS. User interface provides a means for the user to get work done more quickly and efficiently. Every app and every website has a user interface.

Different types of user interface exist. The most common are the graphical user interface, or GUI, and the command line interface.

Graphical User Interfaces: The graphical user interface accepts commands primarily in the form of drop-down menus, mouse movements, and mouse clicks. The graphical user interface is used for playing games, watching videos, etc. GUIs are powerful and easy to use but require a lot of processing power.

In most operating systems, the primary user interface is graphical, i.e. instead of typing the commands you manipulate various graphical objects (such as icons) with a pointing device.

Command Line Interface: Command Line Interfaces are text-based. The command line interface relies on typed commands which provide direct access to various methods within operating system such as File system, I/O system, and network services. CLIs require little processing power and are extremely powerful, but it can take longer to learn how to use a CLI than a GUI.

(f) Trojan horse and spyware

Ans:

Trojan horse: A trojan horse is a type of malware that disguises itself as legitimate code or software. Once inside the network, attackers are able to carry out any action that a legitimate user could perform, such as exporting files, modifying data, deleting files or install unwanted software etc.. This is the technique of Trojan horse.

Trojan Horses unlike viruses do not reproduce by infecting other files, nor do they self replicate like worms, but they are extremely dangerous to users computer's security and personal privacy. They make a computer susceptible to malicious intruders by allowing them to access and read files. Trojans are designed to damage files, redirect internet

traffic, monitor the user's activity, steal sensitive data or set up backdoor access points to the system.

Trojans may be packaged in downloads for games, tools or apps.

Spyware : These programs gather information about the user in a concealed manner, show pop-up advertisements, redirects the search engine results to paid advertisements etc. It is a malware that's installed on your device without your knowledge or permission. It is a malicious software that enters a user's computer, gathers data from the device and user, and sends it to third parties without their consent.

Spyware collects personal and sensitive information that it sends to advertisers, data collection firms, or malicious actors for a profit. Attackers use it to track, steal, and sell user data, such as internet usage, credit card, and bank account details, or steal user credentials to spoof their identities. Spywares are created for commercial gain.

Spyware can drain the performance of your device, making it slow. It can alter your device's settings. Spywares can imitate your identity through the personal information they've gained.