BCS-011 : COMPUTER BASICS AND PC SOFTWARE

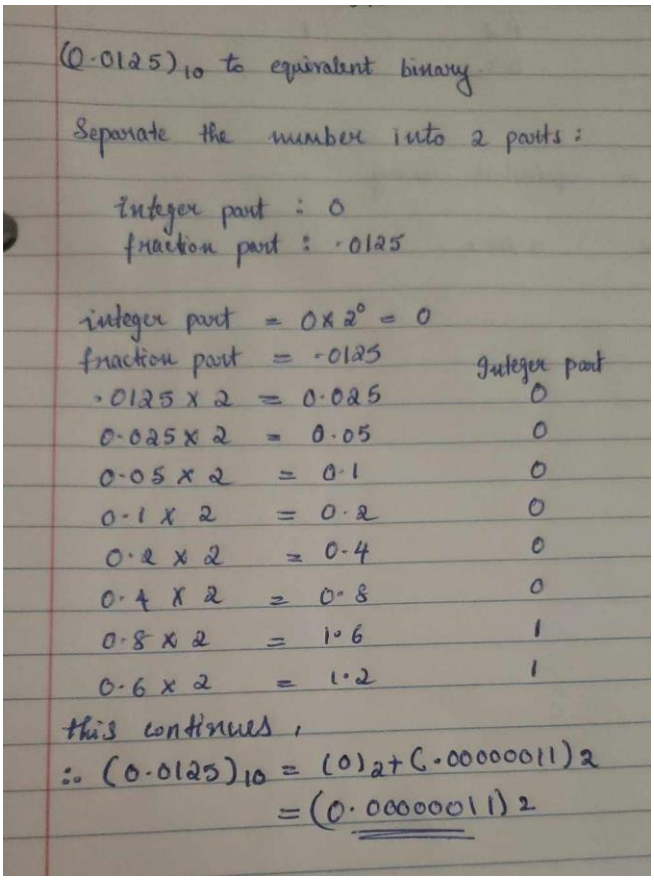
December 2023

1.

(a) Convert the following as asked : 6

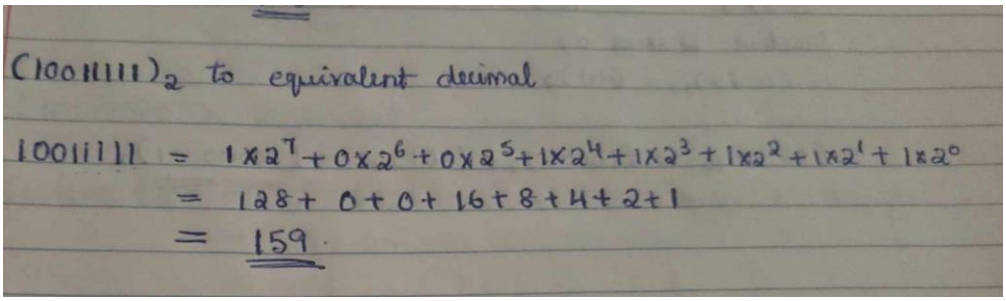
(i) $(0.0125)_{10}$ to equivalent binary

Ans:



(ii) $(10011111)_2$ to equivalent decimal

Ans:



(iii) $(FA5)_{16}$ to equivalent binary

Ans: $(FA5)_{16}$ = 1111 1010 0101

$(FA5)_{16} = (111110100101)_2$

(iv) $(1001\ 0110\ 1110)_2$ to equivalent hexadecimal

Ans: $(1001\ 0110\ 1110)_2$ = 1001 0110 1110

= 9 6 E

$(1001\ 0110\ 1110)_2 = (96E)_{16}$

(b) A computer system has large RAM, still it requires secondary storage. Why ? Explain. 4

Ans: 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) Explain the use and characteristics of the following input-output devices : (i) Bar Code Reader (ii) Speaker and Microphone 4

Ans:

(i) Bar Code Reader

Ans: 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.

A bar code reader is an optical hardware input device that is used to read the information from the barcode posted on the product and decode the information in a human-readable format. It is also used to upload the details of the product in the database.

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.

An example of a barcode reader is a supermarket barcode scanner that reads and logs the price of a product.

(ii) Speaker and Microphone

Ans: 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 with a computer by using a plug and socket. Laptop computers have inbuilt speakers. A speaker is a device that converts electrical signals into sound waves.

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.

(d) Explain why an operating system is needed in a computer system. Differentiate between the system software and application software. 5

Ans: Need for operating system:

An operating system is system software which may be viewed as an organized collection of software consisting of procedures for operating a computer and providing an environment for execution of programs. It acts as an interface between users and the hardware of a computer system. Operating system is the software that manages all the computers' resources to optimize its performance provides common services for efficient execution of various application software and acts as an interpreter between the hardware, application programs and the user.

An operating system is essential for any computer to be useful to us. Operating systems performs basic tasks, such as recognizing input from the keyboard, sending output to the

display screen, keeping track of files and directories on the disk and controlling peripheral devices.

The basic objectives of an operating system are to make the computer system convenient to use and to utilize computer hardware in an efficient manner.

Operating system is a large collection of software, which manages the resources of the computer system, such as memory, processor, file system and input/output devices. It keeps track of the status of each resource and decides which will have control over computer resources, for how long and when.

An operating system (OS) is a system software that manages computer hardware and software resources and provides common services for computer programs. An operating system is an essential software component of a computer system.

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Operating systems performs basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk and controlling peripheral devices.

The operating system is used everywhere today, such as banks, schools, hospitals, companies, mobiles, etc. No device can operate without an operating system because it controls all the user's commands.

System software vs application software

System software	Application software
It is a set of programs which are used to run the system.	Application software is the set of programs necessary to carry out operations for a specified application.
These are programs written by programmers to enable computer to perform a specific task such as inventory control, accounting, railway reservation, billing or any such type of applications in real life.	These are programs written by programmers to enable computer to perform a specific task such as inventory control, accounting, railway reservation, billing or any such type of applications in real life.
It is a general-purpose software.	It is a specific-purpose software.
They are usually written in low-level language such as Assembly language.	These are usually written in high level language such as C, C++, Java etc..

Example for system software is operating system.	Example for application software is media player, calculator etc.
It acts as an interface between the application software and computer hardware.	It acts as an interface between the end-user and system software.
A computer system can't run without system software.	A computer system can always run without an application software.

(e) What is an algorithm ? What are the three control statements in the context of algorithm ? Explain each statement with the help of an example. 7

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.

Three control statements :

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.

if cond then S1

Example : if (grade >= 50)

Print "Passed"

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

```
if (expression)
    statement
  else
    statement
```

Example:

If num%2==0

Print even

Else

Print odd

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

```
for ( initialization; test condition; updation)
{
   // body of for loop
}
```

Example:

```
For (i=1;i<=5;i==)

{

Print i;

}
```

(f) List any two features of a spreadsheet software. 2

Ans: Features of a spreadsheet software are:

* 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

* 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

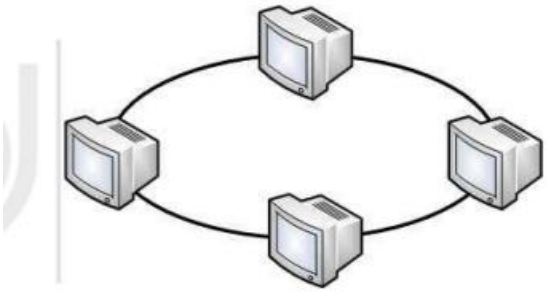
3. Clicking a toolbar button or an area on an object, graphic, or control

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

(g) Explain the ring topology of local area networks. List its advantages and disadvantages. 6

Ans:

Ring topology: Ring topology is also known as circular topology. This layout is like the linear bus, except that the nodes are connected in a circle.



Ring topology

n this topology, each node is connected to two and only two neighboring nodes. The ring does not have an end. It is made of short segments that connect one PC to the next PC and so on Data is accepted from one of the neighboring nodes and is transmitted onwards to another node. Therefore, data travels in only direction from node to node around the rings. Since each computer retransmits what it receives, a ring is an active network and is not subject to signal loss problems. There is no termination because there is no end to the ring.

This type of topology can be found in peer-to-peer networks, in which each machine manages both information processing and the distribution of data files. An example of ring topology is IBM Token Ring.

Advantages of ring topology:

a) It is an orderly network where every device has access to the token (control signal) and the opportunity to transmit – because every computer is given equal access to the token, no computer can monopolize the network.

b) Data flows in one direction. This reduces the chance of packet collision.

c) It can create much larger network using Token Ring.

d) It does not require network server to manage the connectivity between the computers.

e) It has the ability to send data at high speeds.

Disadvantages of ring topology:

a) Network adapter cards and Multi Access Units used in this topology are much more expensive than Ethernet cards and hubs used in bus topology.

b) It is much slower than an Ethernet network under normal load.

c) If one workstation gets failure, the entire network will be impacted.

d) It is difficult to troubleshoot.

e) One malfunctioning node or bad port in the Multi Access Units can create problems for the entire network

(h) Explain the purpose of any four folders that are available in an email software. 4

Ans: An email account has the following folders:

I) Inbox: Inbox is the main folder in your email account. It contains all the e-mails that have arrived in your e-mail account. You can click on inbox to see the mails that you have not read (shown in bold) as well as the mails that you have already read (in normal font).

II) Sent Mail: It shows all the e-mails sent by you from your e-mail account

III) Drafts: This folder stores those messages that you have created but have not been sent by you so far. These messages are saved by you for more work.

IV) Spam: Spam is unsolicited e-mails or junk mails. It is generally e-mail advertising sent to groups of people. Spam can also be termed as unwanted e-mails. Spam mail is also a big cause of computer viruses. Spam mails are identified by the mail services and placed in this folder. These spam mails are automatically deleted after a few days.

V) Trash: Deleted mail is put in the Trash folder. Trash folder allows you to get back an e-mail which has been deleted within a few days of deletion. After a few days, the mail is permanently deleted from the trash folder.

(i) List any four features of a social networking website. 2

Ans: Features of a social networking website are:

- Social networking sites allow users to create personal profile page that informs others about the information that you would like to share about you. Profiles often include names, profile pictures, bios, and other optional information.
- Creating your own network of friends. Users can establish connections with other users, commonly referred to as “friends,” or “followers”.
- Sharing of audio and video may be through YouTube – a popular website where you can put your videos for general public viewership.
- Users can share their thoughts, experiences, and updates with their connections through status updates.

Social networking sites allow users to create personal profiles that showcase their identities, interests, and background information.

2.

(a) What are the different components of a computer ? Explain the role of each component with the help of a diagram. 6

Ans: Structure of a computer

A computer is made up of several different components. All these components work together in order to produce the desired result. The physical components of a computer which can be seen and touched are known as hardware of a computer system. Each of these parts are designed for a specific purpose. Central Processing Unit (CPU), Memory, Input / Output devices like mouse, keyboard, Monitor, CPU, Memory etc. are different hardware components of a computer system. These hardware components are the building block of a computer.

Computer system consists of three basic sections:

1. Input device (i.e. Keyboard, mouse or scanner etc.)

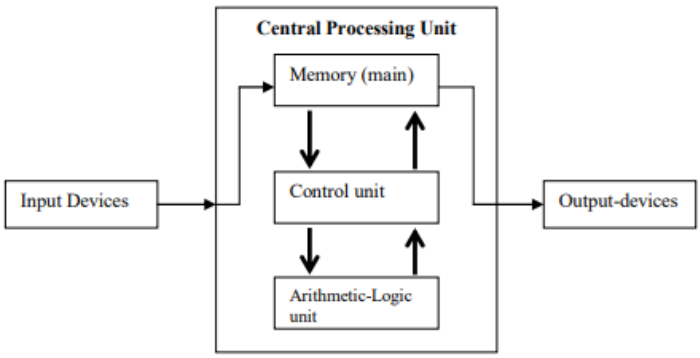
2. Processor (or CPU):

* Control unit (CU)

* Arithmetic and Logic Unit (ALU)

*Memory unit

3. Output device (Visual Display Unit (Monitor/screen) or printer etc.)



Input devices: Input devices are the components or devices of the computer by which we can enter any data into the computer. These devices take input and convert it into binary language that the computer understands. Some common input devices are keyboard, mouse, joystick, scanner etc. Input devices such as a keyboard, mouse or scanner are used to enter input (data and/or instructions), directly into the computer.

Processor or CPU : Central Processing Unit (CPU) is considered as one of the most important component of a computer system. It is also known as the brain of a computer. It contains all the circuitry needed to process input, store data, and other results. The main

function of a CPU is to execute a series of instructions called as program in a specific sequence. CPU contains Arithmetic Logic Unit (ALU) and Control Unit(CU). ALU and CU are jointly known as the central processing unit (CPU). The Arithmetic and Logic Unit is that part of the CPU that actually performs arithmetic and logical operations on data. It performs the basic arithmetic, logical operations specified by the instructions. Arithmetic operations includes addition, subtraction, multiplication, and division. Logical operations includes comparison, selection and merging of data. The CU controls the execution of instructions by decoding the instruction and generating micro-operations to be performed for executing that instruction. It controls the operation of other parts of the computer. Control Unit (CU) is the unit which manages and coordinates the entire operation of a computer system. It controls the operation of the other components of a computer system. The Control Unit of the processor is that unit which controls and coordinates the execution of instructions by the processor. It is responsible for defining and controlling the instruction cycle.

The Memory unit is an important component of a computer where all the data and information are stored in the form of binary digits (combination of 0"s and 1"s) and retrieved whenever necessary. 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. If our computer's CPU had to constantly access the hard drive to retrieve every piece of data it requires, the operation will be very slow. On the other hand, when the data or information is kept in memory the CPU can access it much more quickly. From the time the computer is turned on until the time it is shut down, the CPU is constantly using the memory system. The act of entering data into a storage location is called a memory write operation, and the act of retrieving data from a storage location is called a memory read operation. Data and instructions are moved, to and from memory, in bunches of word length. These memory devices are categorised according to access time, storage capacity and cost-per-bit of storage. Memory is broadly categorised into two types: Primary or main memory (also called semiconductor memory). Secondary or auxiliary memory (magnetic memory/Optical memory).

Based on access time, storage capacity and cost/bit storage, the memory devices (such as RAM, ROM, Hard-disk, Floppy disk, Magnetic disk, Magnetic Tape, CD-ROM, and DVD etc.) can be categorized into three kinds of memory systems:

* Semiconductor memory such as RAM, ROM etc

* Magnetic memory such as Hard-disk, Floppy disk, and Magnetic tapes

* Optical memory such as CD-ROM, DVD etc

(b) Differentiate between the following : 8

(i) CD-ROM and Hard disk

Ans:

CD-ROM	Hard disk
CD-ROM is an optical disk.	It is a magnetic storage device.
In CD-ROM, data can be written only once but read many times.	In a hard disk, data can be erased and written multiple times.
It utilizes all the storage space available on the disk.	It does not utilize all the storage space available.
It is cheaper than hard disks.	Hard disks are relatively expensive
Used for software distribution, music and other data that does not require frequent updates.	Used in computers to store operating systems, applications, and user data.
Leight weight and easy to carry.	Bulkier than CD-ROMs but can be used for portability.
Access speed :Slower than hard disks.	Access speed : Much faster than CD-ROMs.

(ii) Seek time and Latency time in the context of access time

Ans: 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.

Difference between seek time and latency time:

The time required to position the read/write head over proper track is called the seek time. Whereas, latency time is the 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. Seek time varies depending on the position of the arm assembly when a read/write command is received. On the other hand, latency time depends on the Distance of the desired data from the initial position of the head on the specified track and Rotational speed of the disk. Seek time relates to the physical movement of the read/write head. In contrast, latency time relates to the time it takes for the disk to spin to the right position.

(iii) Cache memory and Main memory

Ans:

Main memory	Cache Memory
It is a volatile memory that could store the data as long as the power is supplied.	It is a smaller and fast memory component in the computer.
The size of RAM is bigger than that of cache memory.	Cache memory is less in size.
It is expensive but not as expensive as cache.	It is expensive than RAM.
It holds programs and data that are currently executed by the CPU.	It holds frequently used data by the CPU.
It is not faster than cache memory.	It is faster than main memory.
It is a higher-level memory in the memory hierarchy compared to cache. It is used as the intermediary between the CPU and the storage devices.	It is closer to the CPU in the memory hierarchy, residing between the CPU registers and RAM.

(iv) Transistor and Vacuum tube

Ans: Transistor is a device composed of semiconductor material that amplifies a signal or opens or closes a circuit. Transistors have become the key ingredient of all digital circuits, including computers. Transistor replaced the bulky electric tubes in the first generation computer. Transistors perform the same functions as a vacuum tube, except that electrons move through solid materials instead of through a vacuum. Transistors were made of a semiconducting material and controlled the flow of electricity through the circuit. They also allowed computers to become smaller and more powerful and faster at the same time. They are also less expensive, required less electricity and emitted less heat than vacuum tubes. Manufacturing cost was also very low. Transistors have very high efficiency compared to vacuum tube.

A vacuum tube was a fragile glass device, which used filaments as a source of electronics. It could control and amplify electronic signals. These vacuum tubes were used for calculation as well as storage and control. Vacuum tubes consume large amount of power. The cost of vacuum tube is high. Vacuum tubes are less efficient compared to transistor.Vacuum tubes are large in size.

(c) What is a port ? Explain the uses of parallel port, serial port, universal serial bus and SCSI port. 6

Ans: Port is a connecting socket, outside the system into which different types of cables are plugged. It is a specific place from which other devices can be physically connected. In other words, a port is an interface between the motherboard and an external device of the computer. Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speaker etc.

Uses of serial port: Serial port is used to transmit one bit of a byte, one at a time as a single stream of bits. It is used for transmitting slow data over long distances. Communication over a phone is an example of serial communication. It is a serial communication physical interface which transmits one bit at a time. They are used for connection of external devices like a modem, mouse, or keyboard.

Uses of parallel port: Parallel port can send several bits at the same time as it uses parallel communication. They are generally used for connecting scanners and printers. A parallel port transmits 8 bits of a byte of data in parallel. It is used for transmitting fast data over short distances. A Parallel port is primarily used to connect printers to a computer and hence it is often called a printer port. Since a parallel port transmits an entire byte at a time, it operates I/O ports are the interfaces through which computers communicate with external devices such as printers, modems, joysticks and terminals at a relatively high speed.

Uses of Universal Serial Bus (USB): A USB Port can connect up to 127 peripheral devices such as a digital camera, digital speakers, scanners, speakers etc. It permits Plug and Play – configuring of expansion cards and peripheral devices as and when they are installed. It allows USB devices to be connected to each other with and transfer digital data over USB cables.

Small Computer System Interface (SCSI) Port: SCSI-Small Computer System Interface Port allows data to be transmitted in a daisy chain to up to 7 devices at a speed higher (32 bits at a time) than those possible with serial and parallel ports. It is a fast data transmitting device and is used to connect HDD, CD ROM drives and scanners with the computer system.

3.

(a) Explain the three-tier client-server architecture with the help of a diagram. 5

Ans:

Three-tiered architecture: A new generation of client/server implementation takes a step further and adds a middle tier in between client and server to achieve —3-tier architecture. The 3-tier architecture attempts to overcome some of the limitations of 2-tier schemes by

separating presentation (user interface), processing (business functionality) and data into separate distinct entities. This leads to enhanced network performance and improved extensibility of business systems. In three-tier architecture, the application logic or process lives in the middle-tier, it is separated from the data and the user interface.

The separation of the application into three distinct layers enhances the organization, scalability and maintainability of applications.

The three tiers are:

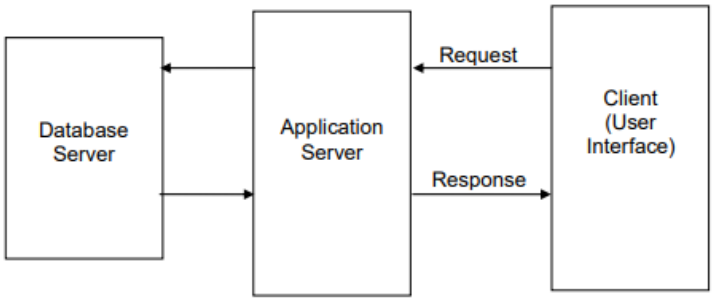
Client tier: This is the top layer where user interacts with the application. It is also known as presentation layer. This layer consists of the user interface that allows users to input data and receive output.

Application tier: This is the middle layer where the application logic or process resides. This tier receives the requests from the client tier, processes the data and sends the result back to the client tier.

Data tier: This is the lowest layer where the data is stored and managed.

One of the advantages of 3-tier client server architecture is that, each layer can be developed, updated and maintained independently. This helps in faster development of the application.

An important disadvantage of 3-tier client server architecture is that, lacks some critical features such as reusability of application logic code and scalability.



Three tier client server architecture

(b) What is multiprogramming ? How is it different from batch processing ? Explain.5

Ans: Multiprogramming system may run many programs on a single processor computer. Multiprogramming system makes it possible for many users or tasks to share the computer resources, providing fuller utilization of the system resources. Multiprogramming allows

the processor to handle multiple batch jobs at a time, multiprogramming can be used to handle multiple interactive jobs. Multiprogramming allows the processor to handle multiple batch jobs at a time, multiprogramming can be used to handle multiple interactive jobs.

A multiprogramming system may run many programs on a single processor computer. If one program must wait for an input/output transfer in a multiprogramming operating system, the other programs are ready to use the CPU. The primary goal of multiprogramming is to manage the entire system's resources.

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.

(c) Explain the concept of one-dimensional and two-dimensional arrays with the help of an example pseudo code of each. 5

Ans:

One-dimensional array:

One dimensional are: A one-dimensional array is a structured collection of elements that can be accessed individually by specifying the position of a component with index/ subscript value. The index would let us refer to the corresponding value.

Like a regular variable, an array must be declared before it is used. A typical declaration for an array in C++ is:

type name [elements];

where type is a valid data type (like int, float...), name is a valid identifier or variable name and the elements field (which is always enclosed in square brackets []), specifies how many of these elements the array will contain. Therefore, in order to declare an array named as marks, that will store marks for 5 students.

```
int marks[5];
```

marks [0]	marks[1]	marks[2]	marks[3]	marks[4]
50	70	80	90	63

Pseudocode for 1D Array:

```
FOR i=0 to 4
        number[i]=i*2
ENDFOR
```

This pseudocode initialises the 'number' array with the first five multiples of 2.

Two dimensional array :

It is a collection of data elements arranged in a grid-like structure with rows and columns. It will have two dimensions and data is represented in the form of rows and columns. Elements of a 2D array are generally represented in the format arr[i][j] where i is the number of rows and j is the number of columns of the array. It can be defined as an array within an array.

Type name [elements] [elements];

Example : int a [3] [3];

	Column1	Column 2	Column 3
Row1	a[0][0]	a[0][1]	a[0][2]
Row2	a[1][0]	a[1][1]	a[1][2]
Row3	a[2][0]	a[2][1]	a[2][2]

Pseudocode for 2D array:

```
FOR i=0 to 2
FOR j=0 to 2
matrix[i][j]=2
```

ENDFOR

ENDFOR

This pseudocode sets all the elements of the ‘matrix’ array to 2.

(d) Explain the features of word processing application. 5

Ans: Few features of word processing are:

• Adding Header, Footer or Page Number to a Document

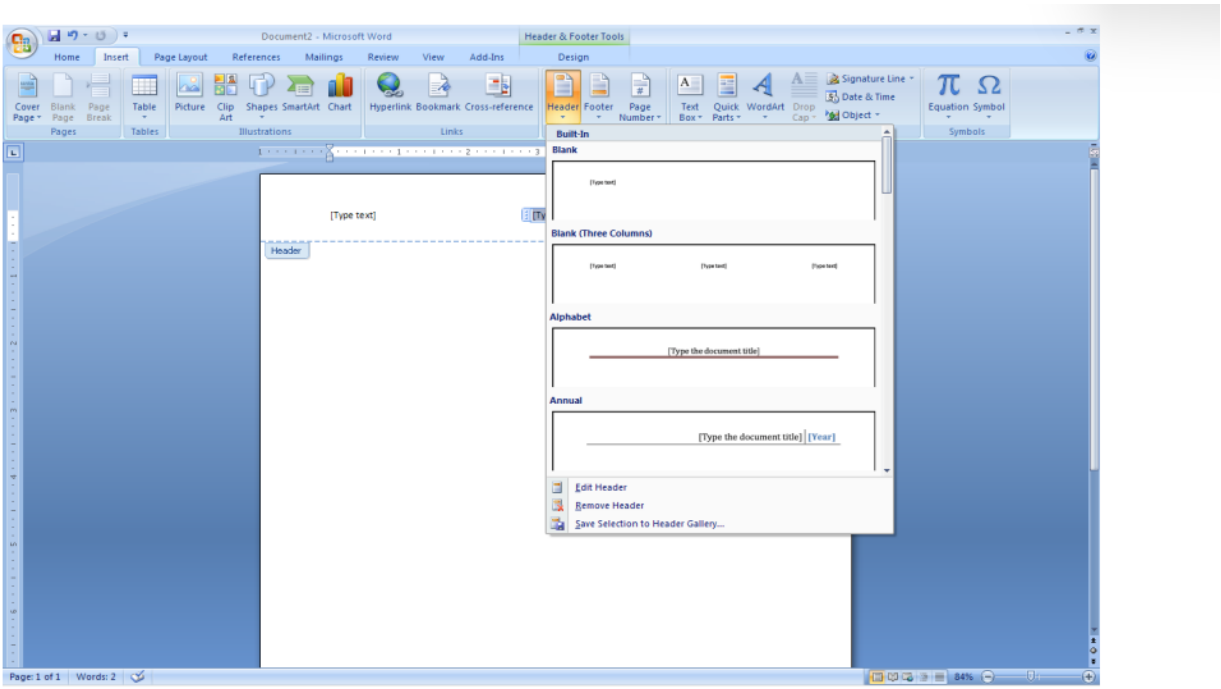
To add a graphic or text on the top or bottom of a document, a Header or Footer has to be added.

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.



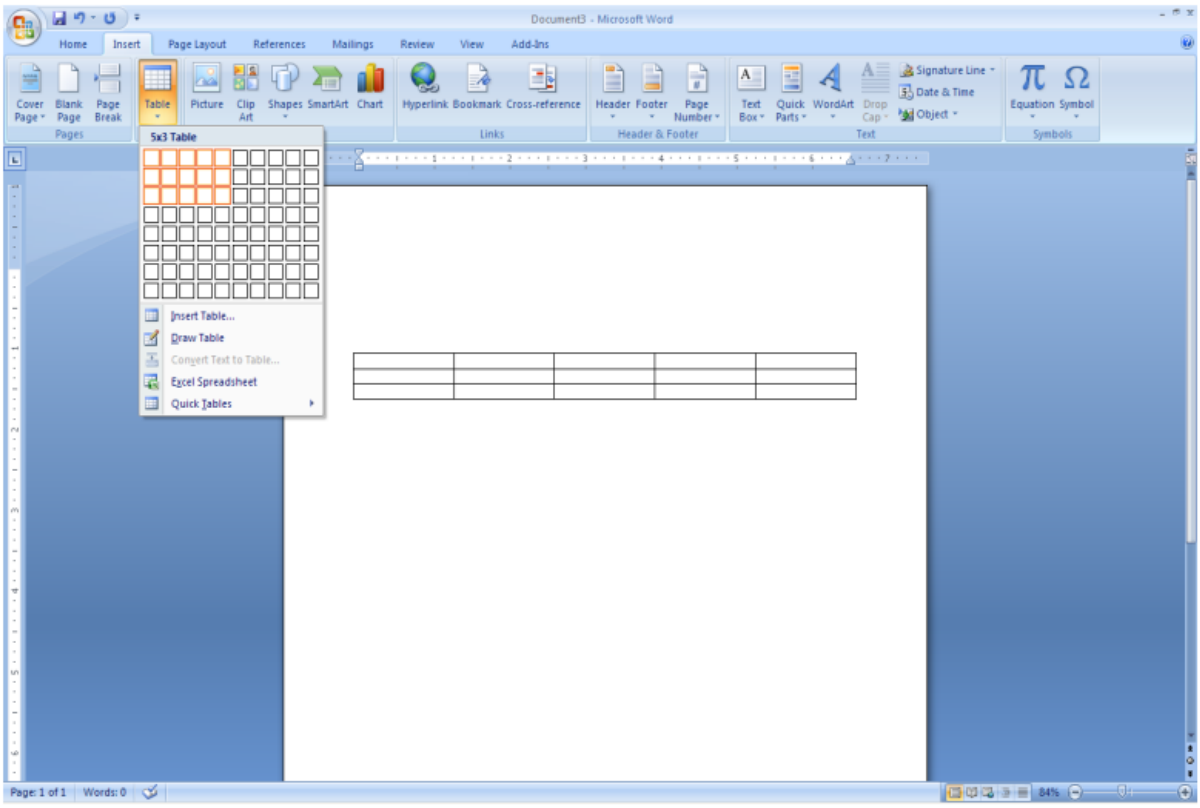
• Creating a table in word :

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.



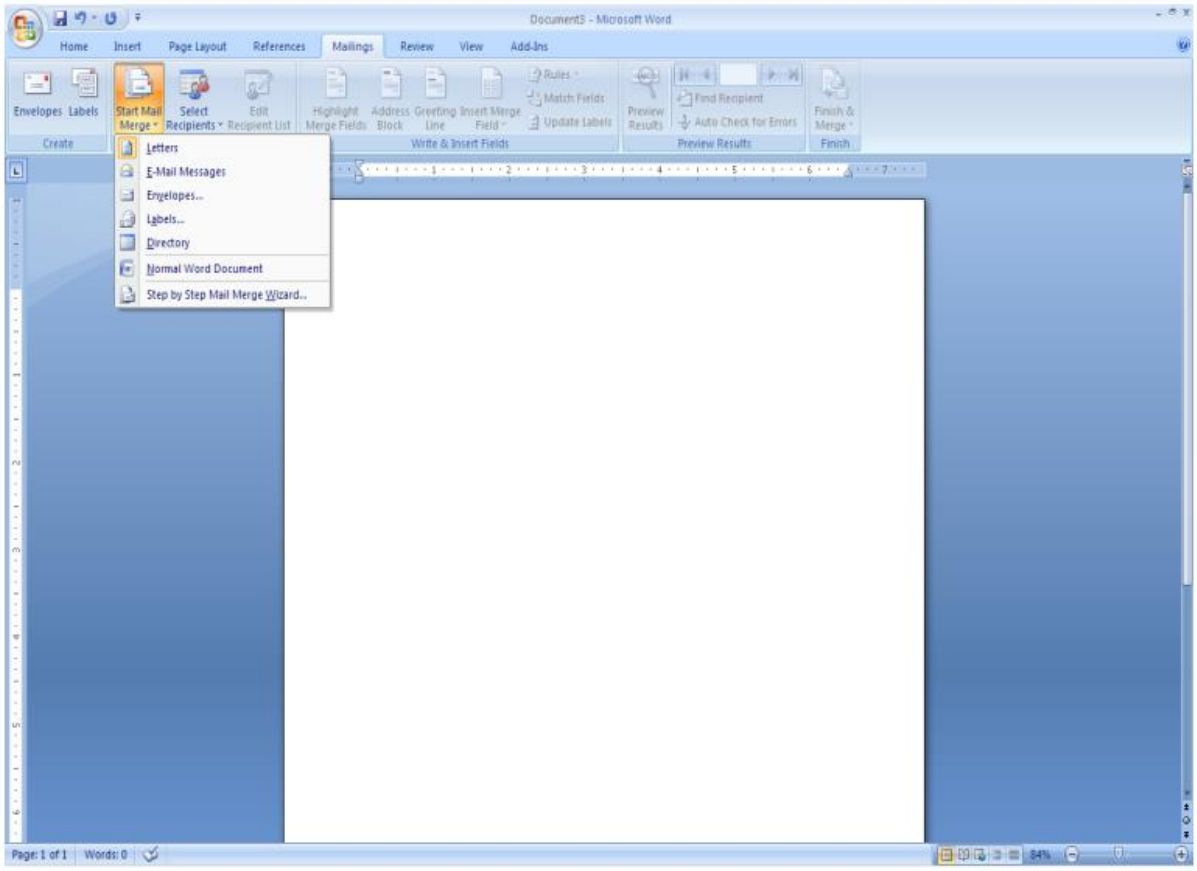
- Creating a memo for multiple recipients-mail merge

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.

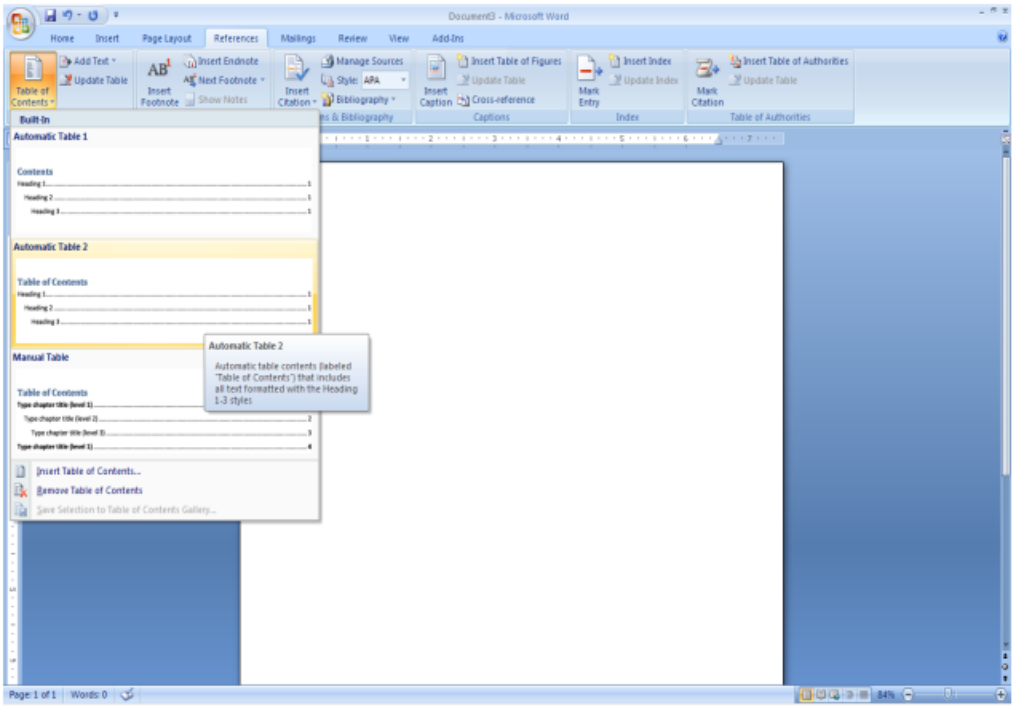
1. Select the text that is to be appear in the TOC

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

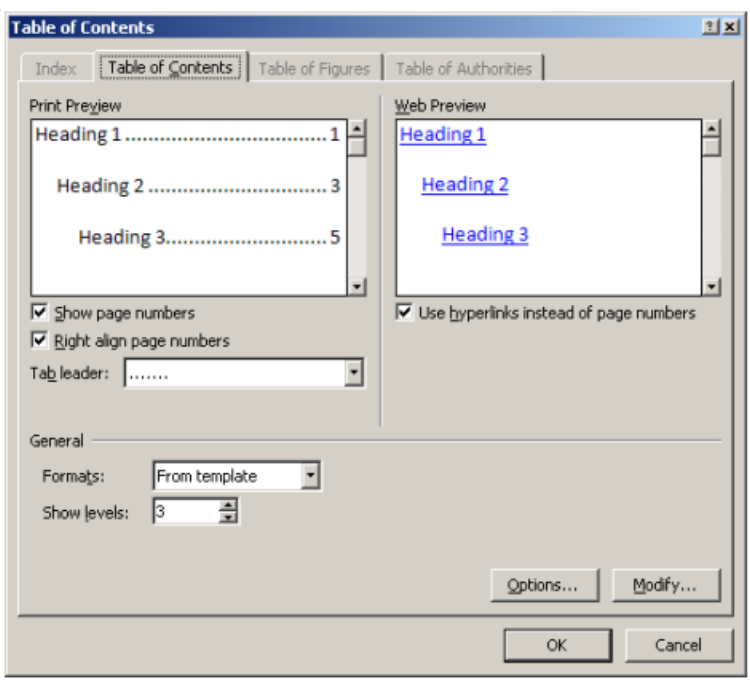
3. Click the place in the document where the TOC has to be inserted.

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.



4.

(a) Explain the characteristics of a Wide Area Network. How is a WAN different to a LAN ? Explain. 5

Ans: Wide Area Network is a network system connecting cities, countries or continents, a network that uses routers and public communications links. The largest and most wellknown example of a WAN is the Internet.

WANs are used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations. Many WANs are built for one particular organization and are private.

WANs are often built using leased lines. At each end of the leased line, a router connects to the LAN on one side and a hub within the WAN on the other. Leased lines can be very expensive. Instead of using leased lines, WANs can also be built around public network or Internet.

Characteristics of WAN:

1) It generally covers large distances (states, countries, continents).

2) Communication medium used are satellite, public telephone networks which are connected by routers.

3) Routers forward packets from one to another on a route from the sender to the receiver.

Difference between LAN and WAN:

LAN	WAN
It stands for Local Area Network.	It stands for Wide Area Network.
LAN's ownership is private.	Ownership can be private or public.
Speed of LAN is high ,upto 10-1Gbps.	Speed of WAN is slower than LAN, 256Kbps-2Mbps and beyond.
There is less congestion in LAN.	There is more congestion in WAN.
LAN (Local Area Network) is a computer network covering a small geographic area, like a home, office, school, or group of buildings.	WAN (Wide Area Network) is a computer network that covers a broad area (e.g., any network whose communications links cross metropolitan, regional, or national boundaries over a long distance).
Because it covers a relatively small geographical area, LAN is easier to maintain at relatively low costs.	Maintaining WAN is difficult because of its wider geographical coverage and higher maintenance costs.
LANs tend to have fewer problems associated with them, as there are smaller number of systems to deal with.	WANs tend to be less fault tolerant as they consist of large number of systems.
Experiences fewer data transmission errors.	Experiences more data transmission errors as compared to LAN
The network in an office building can be an example of LAN.	The internet is a good example of WAN.

(b) What is the need of TCP/IP ? What is a URL ? How is URL different to an IP address ? Explain with the help of an example. 5

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

TCP/IP allows communication between a number of computers (called hosts) connected on a network. 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.

URL: A URL, which stands for Universal Resource Locator. URL is the global address of a document or resource on the WWW. It is the unique web address of a website, image, document or any other resources on the web. A UPL is a type of uniform resource identifier (URI) that provides a way to access information from remote computers, like a web server and cloud storage. Parts of a URL: A URL consists of three parts: The first part is used to tell the browser what kind of server it will connect to. This component of the URL is called protocol. Every URL begins with a protocol. For web pages, this is usually http or https. Other protocols that we can use in this field of an URL are FTP, smtp etc. the protocol is always followed by"://". The second part of the URL is a fully Qualified Domain Name. The fully qualified domain name identifies the site running the server. The domain name (or the domain) is the name of the computer on which the data you are looking for is located (the server). Web servers use port 80 by default, but some servers has been set up to use other ports. The range of Well-Known Ports is in between 0–65535. The first two parts of an URL are used to identify the web server of the website. Each web server has a home page and a directory to store the entire document related to the web page like images, audio, video files. The third component of URL is an optional pathname for a particular document itself. File path is used to find the exact location of the resource we want to access. Example: https://www.exampleurl.com/path/result.html In the above example, the browser will connect to a web server using Hypertext Transfer Protocol Secure (HTTPS). The fully qualified domain name is www.exampleurl.com. The above is the address of the file result.html.

IP address vs URL:

IP address	URL
IP address is a unique numerical identifier that is given to each device linked to the internet.	URL is the unique address of the web page. It is also known as web address.
IP address identifies a typical device attached to the internet.	URL allows you to navigate to a specific web page on the internet.
It is made up of two parts: the network component and the host part.	It is made up of three parts: the protocol, the domain name of the server where the page is found and the path to access that specific page.
Example: 188.112.0.1	Example: www.google.com
IP addresses from the IPv4 address pool are rapidly exhausting, while internet users are	There is no scarcity in web addresses, since web address names have no bounds.

rapidly rising. As a result, IPv6 was designed to solve the scarcity of IP addresses.	

(c) What is the role of a browser software ? What is a search engine ? How does a search engine collects information about web page ? 5

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

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. It allows us to access websites available on the internet.

Search engine: A search engine can be defined as a tool to search diverse and disorganized sources of information available on the Internet. It is a software program that helps people find the information they are looking for online using keywords or phrases. Search engines have some automated programs that need to continuously keep visiting the web pages about the content they have and organize the information about web pages in some format. These programs are called spiders, robots, crawlers, wanderers and worms. Search engines finds, classifies and stores information about the contents of various websites on the Internet.

Search engines are very useful to find information about anything quickly and easily. Using more keywords or different keywords improves the results of searches.

Different types of search engines available are:

a. Primary Search Engines:Such search engines use web crawlers or spiders to traverse the web and scan websites for key words, phrases, to generate database of web pages having some indexing or classification. Google and Alta Vista are examples of primary search engines.

Web directory: Web directories organize information into categories and subcategories or directories. You can search a web directory for all those entries that contain a particular set of keywords. Directories differ from search engines in the way they organize information. Yahoo is an example of web directory.

c. Meta search engines: This type of search engine does not compile databases. Instead, they search various individual search engines simultaneously on behalf of the user and retrieve hits from each of those databases. It passes your queries to many search engines and web directories and presents summarized results to the users. Some of the examples of meta search engines are — Dogpile, Infind, Metacrawler, Metafind and Metasearch.

A search engine performs the following three actions to collect information about web page:

1. Spidering or Web crawling

2. Indexing

3. Searching

Spidering: Spidering is also known as web crawling. Spider or Web crawler is a computer program that browses the web pages of WWW in a systematic, automated manner. They may do this every few days, so it is possible for content to be out-of-date until they crawl your website again. Search Engines use spider for getting up-to-date data on web sites. They are used to create a copy of the pages visited by them for later processing to create Index. These programs are also useful in validating HTML code to a particular standard like XHTML or checking or validating the hyperlinks.

Indexing: : Once, the spiders have completed the task of finding information about Web pages, the search engine must store the information in such way that you are able to use it. The search engine may provide some information relating to relevance of information may be in the form of Ranking. The search engine will try to understand and categorize the content on a web page through keywords. Thus, a search engine may store the keywords of a web page, the number of times that word appeared on the page, the URL of the page. A weighting factor that gives more weightage in case a word is found at the top of the document. Each commercial search engine uses a different formula for assigning weight to the keywords in its index. This is one of the reasons that a search for the same word on different search engines will produce different results. Since the data that is to be stored for indexing is large, therefore, search engine may encode it. The Index is created with the sole purpose, that is, it allows you to find information on the Internet quickly. In general, Index uses hashing.

Searching: When a user enters a query into a search engine, the engine examines its index and provides a listing of best-matching web pages according to its ranking criteria. This short list, usually, have a short summary containing the title of the document and small part of the text. Most search engines support Boolean search.

(d) What are the characteristics of a WIKI ? What are the different advantages of using a WIKI ? 5

Ans: Wiki stands for "What I Know Is". Wiki's are a powerful tool for creating collaborative knowledge resources created by the community. A wiki is a page or collection of Web pages designed to create and edit contents. Wiki supports hyperlinks and has simple text syntax for creating new pages. Wiki's are also used to create websites, to enhance the features of community websites and for knowledge management. The collaborative encyclopedia, Wikipedia is one of the best-known wiki's. It contains very large number of articles – all created and moderated by the community. Ward Cunningham developed the first wiki software - WikiWikiWeb in 1995.

Characteristics of Wiki are:

* A wiki invites all registered users to edit any page or to create new pages within the wiki Website.

* Wiki promotes meaningful topic associations between different pages by making page link creation very easy.

* Wiki promotes discussion and also keeps the history of changes of a document.

Advantages of using WIKI:

* WIKI allows multiple users to collaborate online without face-to-face interaction.

* Wikis can be accessed from anywhere, by anyone with an internet connection.

* A wiki serves as a centralised repository for information. It makes it easier to find and access resources, reducing the need to search through multiple resources.

* It has a user friendly interface that is easy to use.

* WIKI allows users easily publish, edit, manage, access and share information.

* Wikis provide a platform for sharing knowledge and information on a wide range of topics.

5. Explain the following with the help of a diagram/example; if needed : 5×4=20

(a) Features of E-learning

Ans: E-learning is electronic based learning that uses latest technologies to support the delivery of training or education. E-learning as far as reach and access is concerned provides better opportunities for the learner. In addition, if e-learning uses Content and

Learner Management System then can provide useful tips for teachers about the learners and usefulness of content. E-learning can also support interactivity.

Some of the key features of e-learning include:

- Flexibility: E-learning allows students to access course materials and participate in learning activities at their own pace and convenience. This feature is beneficial for individuals with busy schedules or those who prefer to learn at their own speed.
- Accessibility: E-learning makes education more accessible to a wider range of learners, including those with physical disabilities or those living in remote areas.
- Interactivity: Many e-learning platforms incorporate interactive elements such as quizzes, simulations and multimedia content to engage learners and enhance understanding. These features can make the learning process more engaging and effective.
- Scalability: E-learning can easily accommodate a large number of students without the constraints of physical classroom space. This features allows educational institutions to reach a broader audience and offer courses to a diverse group of learners.

(b) Perverse Software

Ans: Perverse software is a program which causes hindrances in other programs execution in such a way resulting in modification or complete destruction of data without the user's intention or even sabotaging the operational system. It is a type of software that is designed to secretly access a computer system, without the owner‘s consent, and damage the system. The impact can be as damaging as shutting down a business, pulling down computer network or significantly impacting regular use of individual computer systems etc. The damage done can vary from something as little as changing the author's name in a document to full control of one‘s machine without the ability to easily find out.

Perverse Software is also known as Malicious software or malware. It is a type of software that is designed to secretly access a computer system, without the owner‘s consent, and damage the system. The impact can be as damaging as shutting down a business, pulling down computer network or significantly impacting regular use of individual computer systems etc. The damage done can vary from something as little as changing the author's name in a document to full control of one‘s machine without the ability to easily find out.

These are destructive software meant for damaging the data or applications by some antisocial elements and enter in the system without the consent of the owner. Malware

can harm the system badly by damaging the useful data and application software, even it does not spare the operating system of the computer.

Early infectious programs, such as Internet Worm and MS DOS viruses, were written as experiments and were largely harmless or at most annoying. With the spread of broadband Internet access, malicious software has been designed for a profit, for forced advertising. Here the malware keeps track of user‘s web browsing, and pushes related advertisements.

Typical types of malicious software are - Computer virus, Computer Worm, Trojan horse, Rootkits, Spyware etc.

Computer Virus: It is a small software program that is designed to enter a computer without users permission or knowledge, to interfere with computer operation and to spread from one computer to another. A computer virus needs to attach itself to a document or program to infect other computers or programs. There are various types of computer virus that can be classified by their origins, techniques of attack, modes of spreading, forms of infections, hiding locations and the kind of damage caused. Examples of computer viruses are: Randex, Melissa.A and Trj.Reboot.

Computer Worm: Computer Worm is a program that is very similar to a virus. It has ability to self replicate. It actively spreads itself over the network, copies itself from one disk drive to another or copies using email. It does not need user action to start it unlike virus. Examples of worms include: PSWBugbear.B, Lovgate.F, Trile.C, Sobig.D, Mapson.

Data-stealing This is a web threat that results in stealing of personal and proprietary information to be used for commercial gains either directly or via underground distribution. Some popular examples of recent data-stealing cases are – steal and sell large number of credit card numbers from businesses such as TJX, OfficeMax, Sports Authority etc.

Keystroke loggers: This is a program, once installed on the system, which intercepts the keys when entering the password or the Credit Card number while shopping online. This can be used for Credit Card fraud.

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.

Effects of perverse software are:

- Data theft: Malwares can steal sensitive information such as personal data, financial details, login credentials and more from infected devices. Such stolen information can be used for identity theft, financial fraud or malicious other malicious activities.

- Slow performance: Malwares can use up system resources which results in slow performance, slowly start up times and overall degradation of the devices speed and efficiency.
- Damage the system: Malware can corrupt files, damage the OS, and cause system crashes. It can also modify or delete important data, leading to loss of valuable information.
- Financial loss: Malware can lead to financial losses for individuals and organizations due to stolen funds, unauthorized transactions, system downtime and data recovery costs.

(c) Features of project management software

Ans: Features of Project Management System:

(i) Scheduling: One of the most common purposes is to schedule a series of events or tasks. The complexity of this schedule can vary considerably depending on how the tool is used. Some common challenges include:

1. Events which depend on one another in different ways

2. Scheduling team members tasks along with the resources required by them commonly termed resource scheduling.

3. Dealing with uncertainties in the estimates of the duration of each task.

ii) Timesheet Management

Ans: A good timesheet management system is essential both for the customer projects as well as internal activities within the organization. Timesheets not only help the Project Manager in managing the project in a better manner but is also useful for maintaining employee records for payroll calculations as well as helps in improving the overall productivity of the organization.

A timesheet is a record of the number of hours an employee spends in completing a certain task. This task could be associated with a customer project or with internal business activities. The timesheet not only provides the number of actual hours that the employee may have spend on the task but also mentions details of the task involved and the kind of operations that the task involved completing. Another benefit of a good timesheet management system is that it can help management track the efficiency of employees and find ways in which they can improve the productivity in various areas

Timesheet management systems can also help employees evaluate their own performances and understand how they can perform their tasks better.

(iii) Calculating critical path:

In many complex schedules, there will be a critical path, or series of events which depend on each other, and whose durations directly determine the length of the whole project. Some software applications (for example, Dependency Structure Matrix solutions) can highlight these tasks, thus helping in optimization of effort.

(d) Different types of printers

Ans:

Classification on the basis of printing technology:

1. Impact printers use variations of the standard typewriter printing mechanism where a hammer strikes paper through an inked ribbon.
2. A non Impact printer uses chemical, heat or electrical signals to produce symbols on paper. Some of these require special coated or treated paper to print characters on them.

Classification of printers on the basis of speed :

1. Character Printer : These printers can print only one character at a time. The examples are Daisy Wheel Printer, Dot Matrix Printer. They work similar to a typewriter.

(a) Daisy-Wheel Printer : This printer is similar to a ball-head typewriter. This type of printer has a plastic or metal wheel on which the shape of each character is embossed. A hammer presses the wheel against a ribbon, which in turn makes an ink stain in the shape of the character on the paper. Daisy-wheel printers produce better quality print but cannot print graphics. The print quality of this impact printer is very low as is the speed. These are practically obsolete now.

(b) Dot-Matrix Printer : This is one of the most popular printers used for personal computing systems. These printers are relatively cheaper compared to other technologies and use impact technology. Characters in this printer are formed by the combination of dots. A Dot-Matrix printer creates characters by striking pins against an ink soaked ribbon. Each pin makes a dot and combinations of dots form characters and illustrations. The moving portion of the printer is called the print head.

2. Line Printer: As the name suggests a line printer is a high speed printer which is used to print one entire line of text at a time. Line printers are used to print large amount of data, printing labels, accounting work and other large business printing applications in data centers. These are fast printers ranging in speed from 300 to 2500 lines per minute. Examples are Drum Printers and Chain Printers.

3. Page Printer: These are very high speed printers which produce high quality output. Their speed ranges from10-25 pages per minute. These printers are commonly used today. They use modern Laser Printer technology and print a whole page at one go. There are many varieties of laser page printers and so their prices range from base level upwards.

Classification of printers on the basis of quality:

1. Ink-jet Printer: The Inkjet printer works on inkjet technology and produces better quality printouts than dot matrix printers. These print by spraying a controlled stream of tiny ink droplets accurately on the paper forming either dot matrix or solid characters. The printing quality of these printers is very good with a speed of 700 or more characters per second. These are non-impact and hence are relatively silent during the printing process. These printers are easy to use and can be used to print color pages.

2. Laser Printer : This is a high quality, high speed and high volume technology printer. In laser printers, a laser beam is used to produce an image on a drum. The light of the laser alters the electrical charge on the drum wherever it hits it. The drum is then rolled through a reservoir of toner, which is picked up by the charged portions of the drum. Finally, the toner is transferred to the paper through a combination of heat and pressure. Laser printers produce very high quality text and graphics but are expensive. The technology used by them is the same as that of photocopying machines. The speed of laser printers varies from 10 pages per minute to 200 pages per minute. Laser printers are also called page printers; because they print a whole page at one go.

Standard laser printers can be classified into two categories in terms of color:

* Monochrome laser printer, and

* Color laser printer

Monochrome laser printers use a single toner. Color laser printers use four toners to print in full color. These printers are about five to ten times as expensive as their monochrome siblings. Color laser printers are popular and are being widely used, in spite of their cost. To print documents with graphics and photographs a color laser printer is a good option. Print speed, quality, printer resolution, reliability and the costs of toner are the major deciding factors for choosing a printer.

(e) Disk checkers and disk defragmenters

Ans:

Disk checkers:

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.

Disk defragmenters:

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.

The main benefits of defragmentation are that 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.