BCS-011 COMPUTER BASICS AND PC SOFTWARE

December 2013

1.

(a) Explain the working of the various components of a computer, 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.)

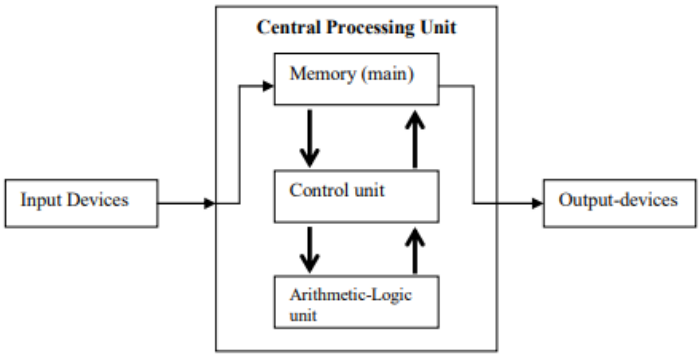
2. Processor (or CPU):

* 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) What are Arrays and what is their utility. Explain the two types of arrays and with the help of an example depict the storage of data in them. 7

Ans: An array is a linear data structure where all are arranged sequentially. It is a collection of elements of same data type stored at contiguous memory locations. Each element can be individually referenced by an index.

Utilities of an array:

In programming, when large amount of related data needs to be processed and each data element is stored with different a variable name, it becomes very difficult to manage and manipulate. Arrays provide a way to store and manage multiple values or data items under a single variable name, making it easier to work with a large set of related data. This means data can be accessed quicker than if stored across multiple variables, improving program efficiency significantly. Arrays offer immediate random access to elements, efficient memory utilization and faster manipulation.

The two types of array used are:

* One dimensional array

* two 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

Two dimensional arrays: 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]

(c) What is a computer network ? What are its advantages ? Differentiate between guided and unguided data transmission channels. 7

Ans: A computer network can be simply defined as the interconnection of two or more independent computers for transmitting and sharing information. Any device which can share or receive the data is called a node. The computers on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams. They are used in our homes, schools, colleges, railway stations, offices and businesses. They help us to send emails, watch a live sports event on our computer, book rail/air tickets and chat with our friends. The Internet is the world's largest computer network.

Advantages of computer network:

* Resource sharing: It is one of the important applications of computer networking. We can share a single software among multiple users. We can share hardware devices via this technique. A network is needed because of the desire to share the sharable programs, data, and equipment available to anyone on the network. We can also share processing load on various networked resources.

* Communication medium: It means various ways through which we can communicate like Email, calls, broadcasts etc..

* Scalability: The ability to increase system performance gradually by adding more processors (incremental upgrade).

* High reliability: Reliability implies backing up information. Due to some reason equipment crashes, and so on, the information gets undermined or inaccessible on one PC, and another duplicate of similar information is accessible on another workstation for future use, which prompts smooth working and further handling without interruption. This is a very important property for military, banking, air traffic control, and many other applications.

* Cost-benefit advantage: A network may consist of many powerful small computers, one per user. You can keep the data and applications on one or more shared and powerful file server machines. This is called the client-server model. Such model offers a much better price/performance ratio than old mainframes. At present many server services have been moved to Internet based resources set up by a third party and shared by many (called cloud). This allows users to use powerful server applications and data services without maintaining servers. Such system may bring down the cost further. However, such models still have several issues that are being debated.

Guided and unguided transmission channels:

Guided transmission channel	Unguided transmission channel
It provide a physical connection between two devices.	It is used for transmitting the signal without any physical media.
Twisted pair cable, coaxial cable and optical fiber are examples.	Microwaves, infrared waves and radio waves are examples.
It is also known as wired communication.	It is also known as wireless communication.
The signal energy propagates through wires in guided media.	The signal energy propagates through the air in unguided media.
It is used for point-to-point communication.	It is generally used for radio broadcasting in all directions.
It is cost-effective.	It is expensive.
For a shorter distance, this is the best option.	For longer distances, this method is used.
By adding more wires, the transmission capacity can be increased in guided media.	It is not possible to obtain additional capacity in unguided media.
Less susceptible to interference	More susceptible to interference.

(d) What is Moodle ? Describe its role in E-learning. 5

Ans: Moodle stands for Modular Object-Oriented Dynamic Learning Environment. MOODLE is a free and open-source e-learning software platform. It provides feature for Learners and content management. It is an open-source Learning Management System used to create and manage online courses.

The popularity of MOODLE may be attributed primarily to the fact that it is free and it allows dynamic content creation facilities. It has a number of tools available for managing a number of students online. In addition to content management, MOODLE provides a number of tools for building interaction among the learning community. Thus, allowing collaboration and peer to peer learning in the learning communities. Moodle is the world's most recognized learning management system (LMS). Its flexibility makes it suitable for traditional, hybrid and distance learning.

Role of MOODLE in e-learning:

Moodle is a free, online Learning Management system enabling educators to create their own private website filled with dynamic courses that extend learning, any time anywhere. Moodle meets the needs of a teacher, student or administrator. Learners can access course materials and complete assignments with ease while instructors can create and manage courses, deliver content ,set up assessments and track student progress. It provides a single robust, secure and integrated system to create personalized learning environments. Moodle can be used as a tool for delivering content to students and can be used to build rich collaborative learning communities.

Moodle is an open-source software platform that serves as a Learning Management System (LMS) widely used in educational institutions. Designed to facilitate online learning and communication. It supports various interactive activities such as forums, quizzes, and assignments making it a two-way communication tool that actively engages students.

(e) Explain memory hierarchy with the help of suitable diagram. 5

Ans: Most computer systems make use of a hierarchy of memory technologies, this hierarchy is known as the memory hierarchy. Memory hierarchy helps in organizing the memory in a way that it can minimize the access time. The memory hierarchy in OS is an essential concept in computer science. The overall goal of Memory Hierarchy is to obtain the highest possible access speed while minimizing the total cost of the memory system.

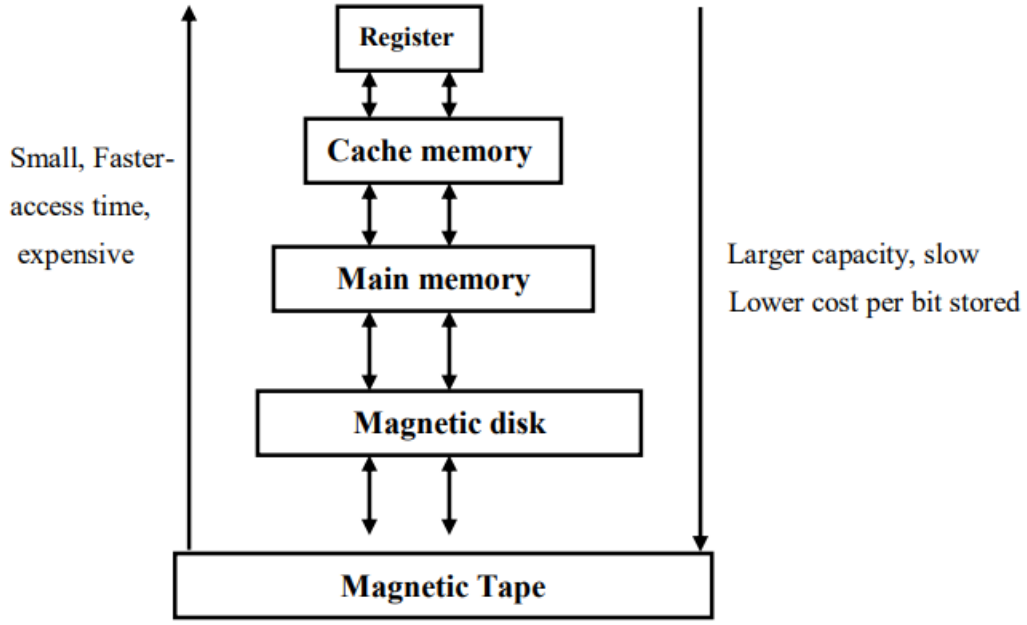
A computer system uses a variety of devices for storing the instructions and data. A storage devices (or units) may vary according to the access time, storage capacity, and cost-per-bit of storage. A storage devices (or units) may vary according to the access time, storage capacity, and cost-per-bit of storage . Based on these criteria, a memory system consists of three groups of memories.

1. Processor's internal (CPU) memories: consisting of the small set of high speed registers which are internal to a processor and are used as temporary locations where actual processing is done.

2. Primary (main) memory: It is a fast and large memory but slower than processor memory. Primary memory has faster access time, smaller storage capacity and higher cost per bit storage. This memory is accessed directly by the processor. It stores programs and data which are currently needed by the CPU. The size of the main memory is kept small because of its high cost.

3. Secondary (or auxiliary) memory: The secondary memory is mainly used for bulk storage (mass storage) of programs, data and other information. It has much larger capacity than main memory but slower than main memory. It basically stores system software, compiler, assembler and useful packages, large data files etc.

CPU registers hold the most frequently used data. Small, fast cache memories nearby the CPU act as staging areas for a subset of the data and instructions stored in the relatively slow main memory. The main memory stages data stored on large, slow disks, which in turn often serve as staging areas for data stored on the disks or tapes of other machines connected by networks.



Memory hierarchy

As we move up the storage hierarchy we have faster access time, less capacity and higher cost per bit stored. When we move down, we have a larger storage capacity, slower access time and lower cost per bit stored.

Thus, CPU storage components generally have the fastest access time, the smallest storage capacity and the highest cost per bit stored. The cache memory which is placed in between the CPU and the main memory is a very high speed semiconductor memory used to enhance the speed of main memory. The main (primary) memory falls next in the memory hierarchy list. Secondary storage media such as hard-disk/magnetic disk memories make up the level of hierarchy just below the main memory. Secondary storage devices are at the bottom of the memory hierarchy. Secondary storage devices such as magnetic tapes are used for archival storage. They are very cost effective and so are used for mass storage of data, when fast access time is not required.

Need for Memory hierarchy based on access time and cost balance: The main reason for using a memory hierarchy is to balance access time and cost. Less access time means more cost. Like registers are the smallest of all, their access time (time to fetch the data) will be faster, and their cost will be expensive. In the same way, secondary memory is the largest, so the access time will be more, but the cost will be less than other memories. In a nutshell, as the size increase, the access time also increases but the cost decreases.

Need for memory hierarchy based on Speed of communication: The CPU is responsible for fetching instructions, executing them, storing data, and controlling all other devices in the computer system. The speed at which the CPU can process data and execute instructions is much higher than the input rate of data from a hard disk. To solve this, computer system designers came up with a mechanism called a memory hierarchy that allows the CPU to get instructions and data from fast memory like registers and cache and process them at a higher speed so that the CPU can keep up with the data rate.

Memory hierarchy based on capacity: It is the volume of information the memory can store. As we move from top to bottom in the hierarchy, the capacity increases.

Performance: Increases when users need to access lower memory hierarchy levels less frequently. Without the memory hierarchy, a speed gap exists between the main memory and CPU registers.

(f) Explain various categories of printers on the basis of speed and quality. 6

Ans: 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.

(g) What is E-mail ? Write steps to create E-mail account. 4

Ans: Electronic mail is commonly known as email. It is a communication method that uses electronic devices to deliver messages across computer networks. It is one of the most popular methods of digital communication. It is mostly used in business, education, technical communication, and document interactions. It allows communication with people all over the world without bothering them. It is a communication that happens in real time and can get important data across to people in various geographies. An email is a record of the communications that have happened and is stored on the server of the

organization. Internet based E-mail system was designed by a computer engineer - Ray Tomlinson in late 1971 while working with ARPANET.

Steps to create an email account:

For sending or receiving email, you need to have to an email account. The email account may be provided by the organization for which you are working or else you can create an account with web-based email providers. If you are working on mail services provided by your organization ‘s mail server, you must install and use email client software such as Microsoft Outlook Express, Pegasus Mail, Apple Mail client, Mozilla Thunderbird etc. On the other hand, if you are using web-based mail services then you may use the mail services offered by any of the web-based mail service providers. Some of these web-based mail providers are – Windows Live mail, Yahoo mail, Gmail, Rediffmail, and many more.

Following are the steps to create an email account:

Step 1: Start the browser and open the Gmail Homepage www.gmail.com.

Step 2: Select the —Create an Account‖ button on the right.

Step 3: Fill all the fields and click —I accept. Create my account.

If there are no mistakes then an account will be created, otherwise the error will be displayed. Correct the errors and try again. Your email account is created.

Next time we visit the Gmail website, we can access the account as: Enter the username and password and click —Sign in button.

2.

(a) What is a port ? Explain any four types of ports. 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.

There are many types of ports used in computer system. Some of them are given as follows:

- Serial port: Serial port transmits one bit of a byte, one at a time as a single stream of bits. It is meant 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.

A serial port is also called a communication port and they are used for connection of external devices like a modem, mouse, or keyboard. Serial ports are cheaper and they are easier to shield from interference.

- 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. 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 79 Input and Output Devices I/O devices at a relatively high speed. A Parallel port is primarily used to connect printers to a computer and hence it is often called a printer port.
- 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.
- 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.

(b) Differentiate between Batch and Multiprogramming operating system. 5

Ans:

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	Multiprogramming operating system allows to execute multiple processes by monitoring their

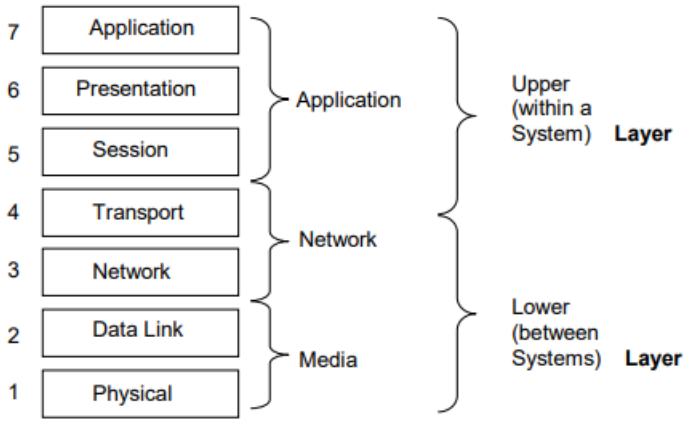
system. In this set of jobs with similar needs are batched together and inputted to the computer for execution.	process states and switching in between processes. It executes multiple programs to avoid CPU and memory underutilization.
Batch system is slower in processing than the multiprogramming system.	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) Describe the OSI Reference Model with the help of a diagram. 9

Ans: OSI stands for Open Systems Interconnection. It was developed by ISO (International Organization for Standardization) in 1984. The OSI model is an abstract description for layered communications and computer network protocol design open system means that it can communicate with any other system that follows the specified standards, formats and semantics. Protocols specify how the different parties may communicate. It is a seven-layer architecture with each layer having specific functionality to perform. All these 7 layers work together to transmit data from one person to another across the globe. It is also referred to as the OSI Seven Layer Model.

A layer is a collection of conceptually similar functions that provide services to the layer above it and receives service from the layer below it. On each layer an instance provides services to the instances at the layer above and requests service from the layer below

The following are the layers of OSI model:



The OSI model is divided into two layers: upper layers and lower layers.

The upper layer of the OSI model mainly deals with the application related issues, and they are implemented only in the software. The application layer is closest to the end user. Both the end user and the application layer interact with the software applications.

The lower layer of the OSI model deals with the data transport issues. The data link layer and the physical layer are implemented in hardware and software. The physical layer is the lowest layer of the OSI model and is closest to the physical medium. The physical layer is mainly responsible for placing the information on the physical medium.

In its most basic form, it divides network architecture into seven layers which from top to bottom are the Application, Presentation, Session, Transport, Network, Data Link, and Physical Layers. In transmission side data flows from layer 7 to layer 1, then to cabling or suitable medium. When data reaches the reception side, it flows from layer 1 to layer 7.

Application Layer:It is the top-most layer of the OSI reference model. This layer is the layer for user interaction. We must have application software for dealing with the data.

Presentation Layer: It converts the data into suitable format. It does tasks like compression, decompression, encryption and decryption.

Session Layer: This layer manages connections between different application layers. This layer is responsible for the establishment of connection, maintenance of sessions, and authentication and ensures security.

Transport Layer: The transport layer provides services to the application layer and takes services from the network layer. This layer converts data into segments and reassembles the data stream. TCP and UDP are the protocols used in this layer. In this layer, data is converted into so called segments. It is responsible for the end-to-end delivery of the complete message. The transport layer also provides the acknowledgement of the successful data transmission and re-transmits the data if an error is found.

Network Layer: This layer translates logical address into physical address. This layer also fixes the route for data path. Router works in this layer. In this layer data is called a packet.

Data-Link Layer: This layer provides physical identification of a device using Media Access Control Address. The data link layer is responsible for the node-to-node delivery of the message. The main function of this layer is to make sure data transfer is error-free from one node to another, over the physical layer. It adds source and destination address to packets and convert them into frames. This is the layer that provides error free transmission.

Physical Layer: The lowest layer of the OSI reference model is the physical layer. This layer provides the functional requirements for activating a physical link. In this layer, data is carried from one device to another.

3. (a) Explain the following terms with the help of example/diagram 15

(i) Access time

Ans: This is the time required to locate and retrieve stored data from the storage unit in response to a program instruction. That is the time interval between the read/write request and the availability of the data. A fast access time is always preferred. Access time is the time it takes a device or program to locate information and make it available to the computer for further processing. Cache memory access time is about 0.5 to 2.5 ns which is much less than that of the main memory. The access time of main memory is about 50-70 ns. Because of its very high cost, the capacity of the cache memory deployed is 2 to 3 percent of that of the main memory. The access time of mass storage devices such as hard disks are measured in milliseconds (ms).

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

Access time = Seek time + Latency time

Seek time: The time required to position the read/write head over proper track is called the seek time.

Latency time: 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.

(ii) DNS

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.

(iii) Plotter

Ans: 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. It is a computer output device which is used to create high-quality images, large formats images and diagrams and drawings on flat surfaces or papers. 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

Drum plotters use a rotating drum to move the paper left and right while one or more fixed pens write up and down.

The drum plotters are generally smaller than flatbed plotters and they have lower resolutions than flatbed plotters. HP, Canon and Epson are the popular companies which manufacture good quality plotters.

(iv) Video card:

Ans: A video card is an expansion card , which is used to produce output images to a display in a monitor. Its main purpose is to generate graphical information. It is responsible for rendering the image on the monitor of a PC . It is also known as video adapter, display adapter or graphics card. A video card should be capable of displaying the best resolution supported by the monitor of the system. These days high performance video cards are available for gaming purposes which requires very high resolution. Video card consists of a circuit board which holds several components such as graphics processing unit (GPU), video memory, video BIOS etc. Video graphics array (VGA), Digital visual interface, high definition multimedia port etc are some of the common connection points used between video card and display.

High performance video cards are available, which has higher visual capability. With increasingly popularity of computer games video cards became one of the most important parts of a computer. One disadvantage of this high performance video card is that consume high power.

The amount of video memory in video card is one of the main considerations while opting for a video card. Advanced graphics port (AGP) and PCI-Express are the two commonly slots available which is used to connect a video card.

(v) Disk checkers:

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:

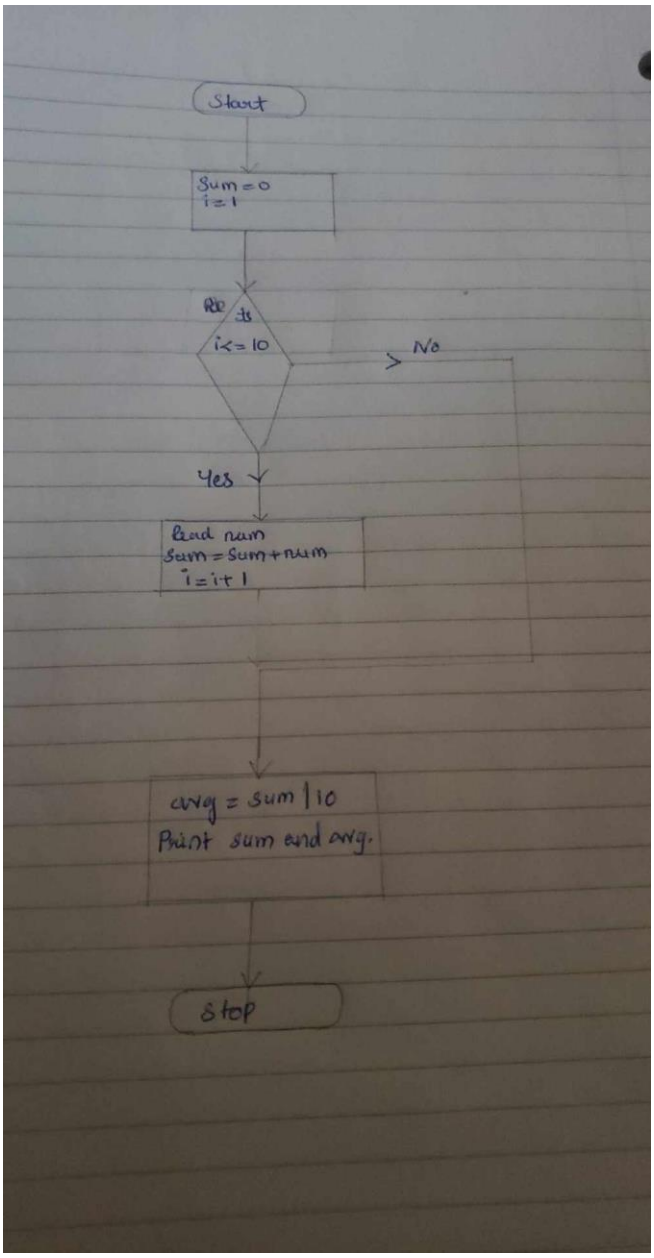
- Click Start and then click Run.
- In Open type cmd and then press enter key, then use one of the following options:

* 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.

(b) Draw a flowchart that accepts ten numbers and displays its sum and average. 5

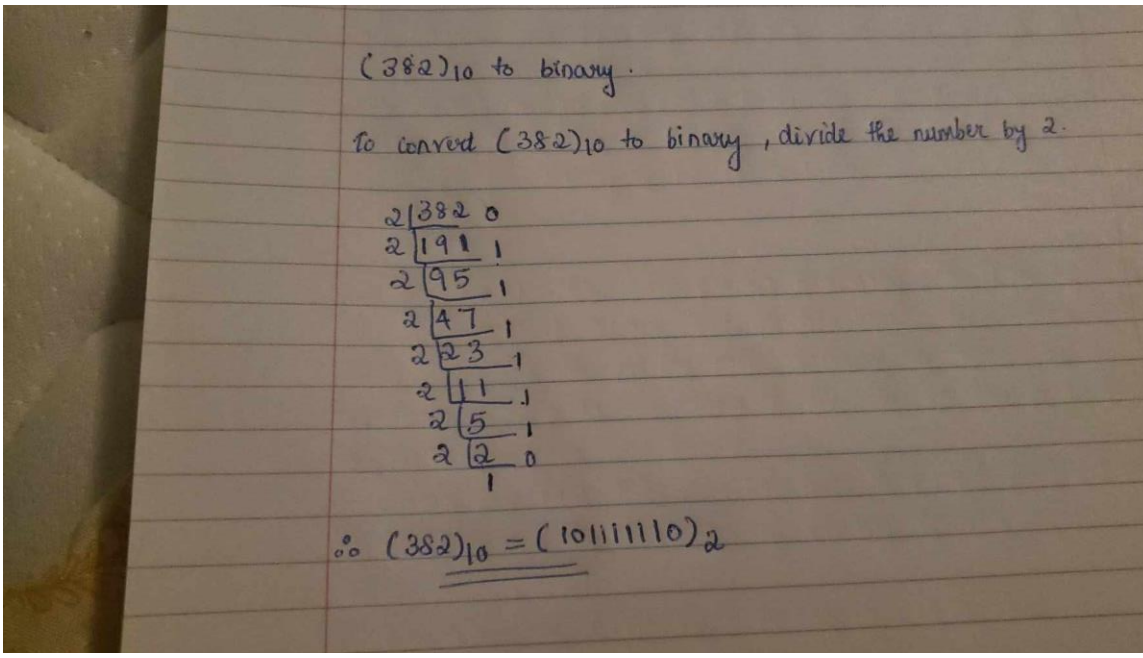


4.

(a) Do the following conversions : 12

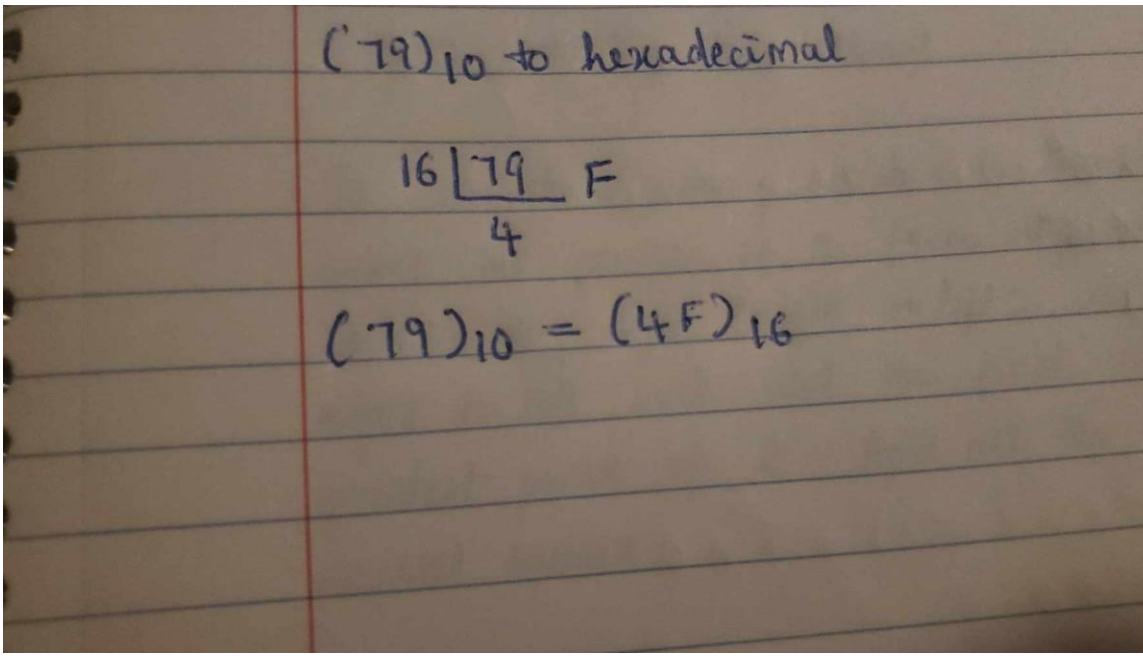
(i) (382)10to Binary

Ans:



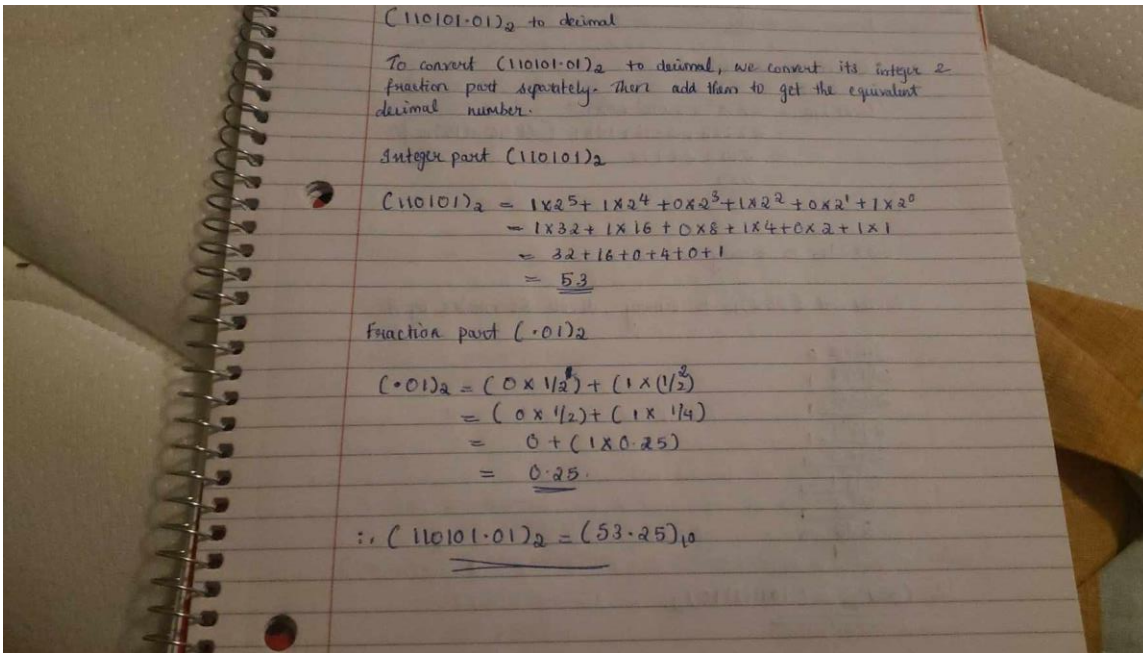
(ii) (79)10to Hexadecimal

Ans:



(iii) (110101.01)2to decimal

Ans:



(iv) (38A)16to Binary

Ans:

(38A)16= 3 8 A

0011 1000 1010

(38A)16 = (001110001010)2

(b) Describe the working of Routers and Gateways. 6

Working of routers: 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 works by receiving data packets from connected devices and determining the best path for each packet to reach its destination. It uses routing tables and protocols to make these decisions. Once the path is determined, the router forwards the packet to the appropriate network segment or device.

A router analyzes a destination IP address of a given packet header and compares it with the routing table to decide the packet's next path. The list of routing tables provides directions to transfer the data to a particular network destination. They have a set of rules that compute the best path to forward the data to the given IP address. To enable communication between other devices and the internet, routers utilize a modem, such as a cable, fiber etc. Most routers include many ports to connect different devices to the internet at the same time. Routing tables are used to determine where to send data and from where the traffic is coming. A routing table specifies the router's default path. So, it might fail to find the best path to forward the data for a particular packet.

There are two types of routing tables: static and dynamic. The static routing tables are configured manually and the dynamic routing tables are automatically updated by dynamic routers based on network activity.

Working of Gateway:

A gateway is a network device that connects two networks that use different transmission protocols. Gateway, also called d protocol converters, can operate at any layer of the networking model. The main function of a gateway is to convert protocols among communications networks. It accepts data formatted for one protocol and convert it to data formatted for another protocol before forwarding it. A gateway can be implemented in hardware, software or both, but they are usually implemented by the software installed within a router. A gateway must understand the protocols used by each network linked into the router. Gateways are slower than bridges, switches and (non- gateway) routers. A gateway usually supports address mapping from one network to another, and may also provide transformation of the data between the environments to support end-to-end application connectivity. The main functionality of a gateway is to convert protocols among communications networks. A gateway on the other hand can accept a packet formatted for one protocol and convert it to packet formatted for another protocol before forwarding it.

The gateway receives data from devices within the network. After receiving data the gateway intercept and analyze data packets, which include analyzing packet header, payload etc. Based on the analysis of the data packets, the gateway calculate an

appropriate destination address of data packet. It then routes the data packets to their destination address. In some cases, the gateway may have to transform the format of the obtained data to ensure compatibility at the receiver. Once the data packets have been analyzed, routed and converted then the gateway sends the last packets to their respective destination address inside the network.

(c) What is a Browser ? 2

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.

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.

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

Features of web browser are:

Some of the features of web browser are:

- Back/Forward Buttons: Back button can be used by you for going back to the previously visited web page whereas the Forward button is used to visit the next page.
- Tabbed Browsing: Using this feature a user can open multiple web pages in the same web browser so that they can easily switch between them.
- Refresh Button: This is also called as reload button. It reloads the current web page and shows updates if any.
- Address bar: Also known as URL Bar is a place where you can type the URL of the website that has to be accessed is entered here. It also displays the address of the web page currently being visited by you. Through this bar user can access different websites or search anything on browser.
- Home: Whenever we open a browser, the first web page which loads is called the home page. This button will bring you back to the home page of your website.

- Recent History: Every browser has a history where it collects links of all previously visited web pages. This is a very handy feature to revisit websites.

5.

(a) What is an Open Source Development Model ? Describe any six features of this model. 8

Ans: Open Source Development Model:

The Open source development model is a collaborative model. It anticipates the participation of many developers in the development of a single product or module. In an open source development model, roles are not clearly defined.

The Open source software development model supports all aspects of various processes like defining requirements, system- level design, detailed design, implementation, integration, field testing, and support in order to produce high quality products implementing client requirements.

Main features of open source development model are:

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.

(b) Explain any four Operating System Services. 12

ns: Five facilities that are provided by an operating system to a user or to a program are:

- Command processor and user interface
- File management system
- Input/output control system
- Process management
- Memory management

1. Command processor and user interface:

To the user, the most important and visible services provided by the OS is the user interface and the capabilities that it provides to execute commands which may not be a part of OS.

These systems consider the user interface as a separate shell that is Operating Sytem provided with the operating system and that interacts with the kernel to provide the necessary-user command capabilities. In UNIX, three different shells, the C shell, the Bourne shell, and the Korn shell are in common use, and many other shells for UNIX are available. Each of these shells provides different command structures and different capabilities.

Different types of user interface exist. The most common are the graphical user interface, or GUI, and the command line interface. The graphical user interface accepts commands primarily in the form of drop-down menus, mouse movements, and mouse clicks. 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. UNIX allows certain class of users called superusers to use some kind of commands for changing the platform or access rights.

2.File Management:

The concept of a file is central to the effective use of a computer system. A file is generally loosely defined as a collection of related information such as students records employee database. It might contain graphical usage. A file may be organized internally into records or it may simply be a stream of bytes. A file constitutes a logical unit of storage, that is, logical to the person or program using the file.

The file management system provides and maintains the mapping between a file logical storage needs and the physical location where it is stored. Users and programs simply access the files by the name, and the file management system handles the details The file

management system identifies and manipulates files by the names provided by their users determines the physical requirements of the file, allocate space for it, stores it in that space, and maintains the information about the file so that it may be retrieved partially or in full, later. The file management system keeps track of the available space on each device connected to the system. The user and the user's program need not be aware of the underlying physical storage issues.

The file management system allows the retrieval and storage of files by name, keeps track of the mappings, allocates and frees space, allows the mounting and unmounting of file structures, and provides other functions required to maintain the structures of the file system.

Directory structures for each I/O device in the system and tools to access and move around these structures. The directory structure provisions are made to move easily from one structure to another.

It also protects files and limit file access to authorized users.

File management systems are particularly important in systems in which secondary storage devices are shared in common by multiple users, since they provide a directory system that assures that there is no duplicate use of physical storage.

3.Input/Output Services:

Every operating system, large or small, provides input/output services for each device in the system. The operating system includes I/O device driver programs for each device installed on the system. These drivers provide services to the file management system and are also available, through the API, to other programs for their use. The I/O device drivers accept I/O requests and perform the actual data transfers between the hardware and specified areas of memory. Devices drivers for newly installed devices are added and integrated into the operating systems. In Windows, this capability is known as plug-and-play.

4. Memory Management: The purpose of the memory management system is to load programs into memory in such a way as to give each program loaded the memory that it requires for execution.

In multiprogramming operating system there are many programs residing in the Operating System memory simultaneously in the memory.

The memory management system has three primary tasks. It attempts to perform these tasks in a way that is fair and efficient to the programs that must be loaded and executed.

1. It keeps track of which parts of the memory are currently being used and by which process into memory together with the space being used and also keeps track of available space.

2. It maintains one or more queues of programs waiting to be loaded into memory as space becomes available, based on such program criteria as priority and memory requirements.

3. When space is available, it allocates memory to the programs that are next to be loaded. It also de-allocates a program's memory space when it completes execution. The de-allocated space is made available for other programs.