BCS-011 : COMPUTER BASICS AND PC SOFTWARE

June 2012

1.

(a) Convert the following hexadecimal number to equivalent binary and decimal : 4

(i) (51)16

Ans: Hexadecimal to binary :

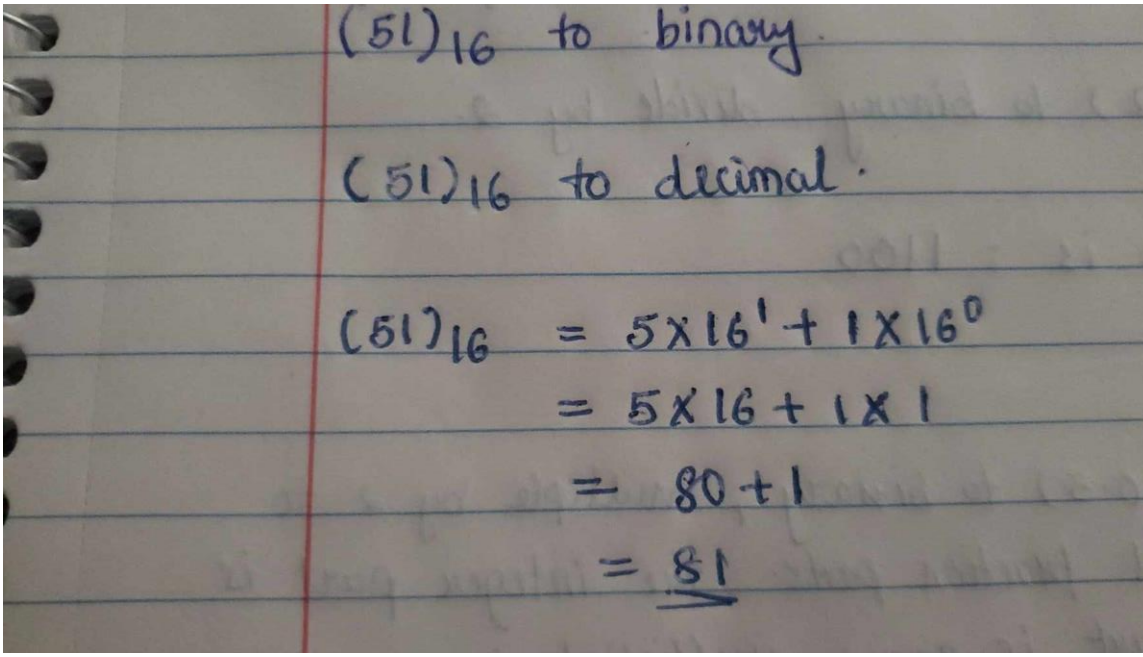
Divide the given hexadecimal number into individual digits. Assign 4-bit binary equivalents to each hexadecimal digit.

(51)16 = 5 1

0101 0001

Thus, (51)16 =(01010001)2

Hexadecimal to decimal:

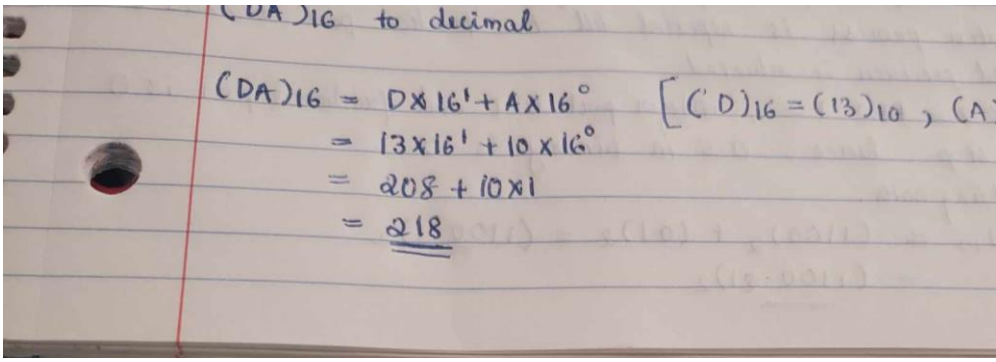


(ii) (DA)16 = D A

1101 1010

Thus, (DA)16=(11011010)2

Hexadecimal to decimal:



(b) How is the access time on a disk is defined ? Explain each of the component of access time with the help of an example. 5

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

It involves the seek time and latency time.

The time required to position the read/write head over proper track is called the seek time. Seek time varies depending on the position of the arm assembly when a read/write command is received. Seek time will be maximum if the arm assembly is positioned on the outer most track and the track to be reached is the inner most one and it will be zero if the arm assembly is already on the desired track. The average seek time is thus specified for most systems which is generally between few milliseconds to fractions of a second. For a

fixed-head system, it is always 0 because there is a head for each track and no head movement is required for accessing a particular track.

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

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

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

Access time = Seek time + Latency time

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

Example:

Consider a hard disk with: 4 surfaces

64 tracks/surface

128 sectors/track

256 bytes/sector

The disk is rotating at 3600 RPM

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

Latency time => 60 sec -> 3600 rotations

1 sec -> 60 rotations

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

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

Average Access time = Seek time+ latency time

=0+8.33 msec.

=8.33msec

(c) Explain the basic structure of a computer system ? With the help of a diagram . A personal computer has a component called motherboard. How is motherboard related to the basic computer structure ? 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.)

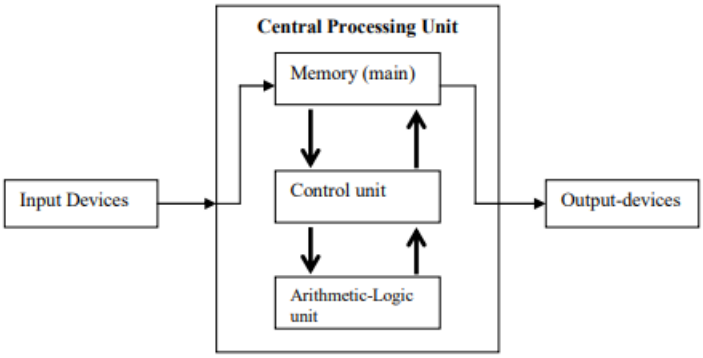
2. Processor (or CPU):

* 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

Relation of motherboard to basic computer system : Motherboard is a main component placed inside the computer case. Motherboard holds some of the most important component of the computer system. It is also known as system board, main board etc. in a typical computer microprocessor, main memory and other components are connected to the motherboard. It acts a s a base for other components. Motherboard also provides connectors for several other devices. A motherboard allows many different parts of our computer to receive power and communicate with one another. The Motherboards usually provides the interface between the CPU memory and input/output peripheral circuits, main memory, and facilities for initial setup of the computer immediately after power-on.

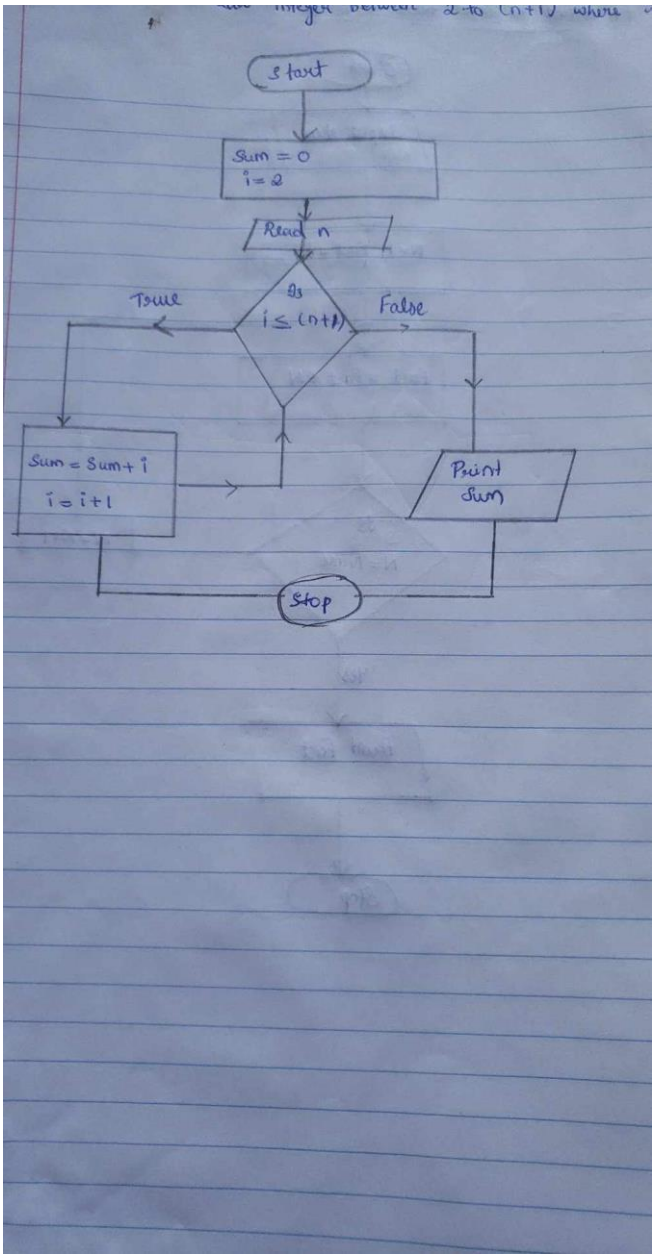
(d) List five facilities that are provided by an operating system to a user or to a program. 5

Ans: Facilities operating system provides to the users and programs:

- The operating system provides interfaces for the user (keyboard, mouse, clicks, and pen drive) and also for the user's programs.
- It provides file system support to manage huge volume of data in to secondary storage device.
- It provides I/O services that can be used by every program.
- It provides networking services.
- It provides boot-strapping or Initial Program Load (IPL) to start a computer
- It manages all kinds of errors and also supports error recovery mechanisms.

(e) Draw a flow chart to add integer between 2 to (n+1) where n>2. 6

Ans:



(f) Explain the terms : Subroutine and function with the help of an example. 3

Ans:

Subroutine :

A subroutine is a type of subprogram, a piece of code within a larger program that performs a specific task and is relatively independent of the remaining code. Another definition is, a set of instructions that are used repeatedly in a program can be referred to as a subroutine. It is also called a procedure, routine or a method. Only one copy of this instruction is

stored in the memory. A subroutine has no value associated with its name. All outputs are defined in terms of arguments; there may be any number of outputs.

subroutine to find the sum of three numbers:

```
SUBROUTINE sub1(a,b,c,sum)
REAL a,b,c,sum
Sum=a+b+c
    RETURN
END
```

Function: The purpose of a function is to take in a number of values or argument ts, do some calculations with those arguments and then return a single result.

Each language has different rules to define a function. In the C programming language the basic block for function is given as:

```
return value function name (argument list)
{
statement;
}
```

Functions can be called from the main program or from anywhere else, even from within itself.

Example :

```
int funname(int a)
{
if((a%2)==0)
return 1;
else
return 0;
}
```

(g) Consider two IP addresses 160. 10. 11. 25

160. 10. 12. 35

Do they belong to the same network , if

(i) The subnet mask is 255.255.0.0

(ii) The subnet mask is 255.255.255.0 Justify your answer.

Ans:

i) If the subnet mask is 255.255.0.0

IP addresses 160.10.11.25 and 160.10.12.35 belong to the same network if the network bits in their binary form are the same. With a subnet mask of 255.255.0.0, the first 16 bits are network bits and the last 16bits are host bits.

Converting IP addresses to binary form:

160.10.11.25 : 10100000.00001010.00001011.00011001

160.10.12.35 : 10100000.00001010.00001100.00100011

As both IP addresses have the same first 16 network bits (10100000.00001010). Therefore, they belong to the same network with the subnet mask.

(ii) The subnet mask is 255.255.255.0

Ans: IP addresses 160.10.11.25 and 160.10.12.35 belong to the same network if the network bits in their binary form are the same. With a subnet mask of 255.255.0.0, the first 16 bits are network bits and the last 16bits are host bits.

Converting IP addresses to binary form:

160.10.11.25 : 10100000.00001010.00001011.11001

160.10.12.35 : 10100000.00001010. 1100. 100011

(h) What is a Wide Area Network (WAN) ? What are the characteristics of WAN ? How are they different from LANs ? Is Internet a WAN ? Justify your answer. 7

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 well-known 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.

Any large network that spreads out over a wide geographic area is a WAN. Internet is a collection of many international networks that connect to each other, hence it is a WAN.

2.

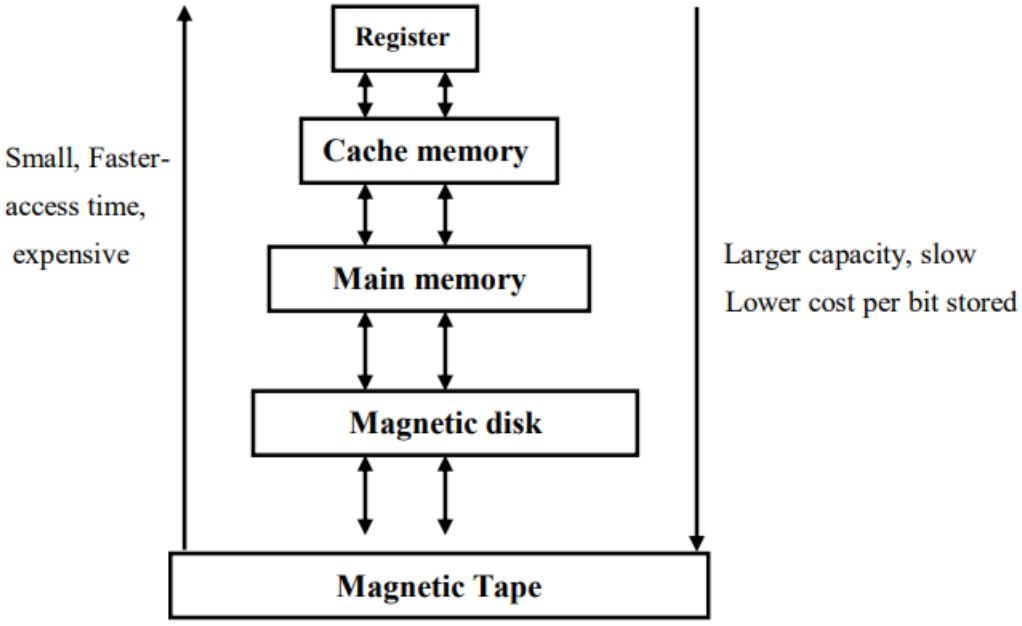
(a) What is the need of memory hierarchy in a computer system ? Explain with the help of various trade offs like cost, speed, size etc.

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. 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.

(b) What is perverse software ? List various types of perverse software. Give four ways to counter 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,k 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 anti-social 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.

4 ways to counter perverse software are :

* Ensure that the operating system and any program one uses are up to date with updates.

* Block unwanted email viruses by installing a spam filter and spam blocker.

* When browsing the internet, always watch what one clicks and installs. Do not simply click OK to dismiss pop-up windows.

* Install anti-virus software; scan and update regularly. It can, in most cases, remove and prevent viruses, worms, trojans, and (depending on the software) some spyware.

* Install anti-spyware/anti-adware; scan and update regularly. It will remove and (depending on the software) prevent future adware and spyware.

(c) What are cookies in the context of Browser software ? Are cookies bad ? Explain. List four precautions for safe browsing.

Ans:

Cookies:

A cookie is a small message sent by the Web server to a your web client. This message is stored by the browser as a text file. The basic purpose of cookie is to store information needed by a server at the user end only. Web browsers store the cookies they receive for a predetermined period of time, or for the length of a user's session on a website. They attach the relevant cookies to any future requests the user makes of the web server. The cookie is used to send information back to the Web Server each time the browser requests a page from the server.

For example, a website may ask you to fill up a form with the information about your name and interests. This information is packaged by the server into a cookie and sent to your Web browser which stores it for later use. The next time, you go to the same Website, your browser will send the stored cookie to the Web server along with the request for a web page. This way, server will be able to remember you and send you only that information that you had desired earlier.

Are cookies bad?

Cookies are merely text files that can be deleted at any time - they are not malicious nor are they programs. Cookies cannot be used to spread viruses and they cannot take control of your hard drive. However, they contain important information about you, so they may be threat to your privacy and anonymity on the Internet.

4 Precautions for safe browsing are:

* Do not click all the links without considering the risks of your actions. Some web page addresses may be disguised and may be very close to address of a site you want to visit but they may take you to an unexpected site.

* You must use the latest versions of browsers and please do not configure them to have decreased security.

* Please do not download or install plug-in from the unknown party such tendencies may put your computer to additional risk.

* Do not visit unsolicited websites, those add to your computer vulnerabilities.

* Third-party software may not have a mechanism for receiving security updates.

3. (a) Compare and contrast the characteristics of the following : 6

(i) Dot matrix printer versus Laser printer

Dot matrix printer	Laser printer
Dot matrix printer is a type of impact printer which prints characters or images by striking by striking pins against an ink soaked ribbon.	It is a type of non-impact printer which prints characters or images without striking paper.
Printing speed of dot matrix printer is slow. w. Speed can be 225 cps to 250 cps.	Printing speed of laser printer is higher than that of dot matrix printer. The speed of laser printers varies from 10 pages per minute to 200 pages per minute
It uses continuous paper sheet for printing process.	It uses individual paper sheets for printing process.
Impact printers have one of the lowest printing costs per page.	It is more expensive.
Noise is generated during printing process.	No noise is generated during printing process.
It provides low quality print when compared to laser printer.	Laser printers produce very high quality text and graphics.

(ii) Cathode ray tube monitors versus liquid crystal display monitors.

Ans:

Cathode Ray Tube monitors (CRT)	Liquid Crystal Display monitors (LCD)
CRT is larger than LCD in terms of size.	While it is small in terms of size.
CRT's resolution is lower than LCD.	While LCD's resolution is more than CRT.
Electron gun is used to form images.	Liquid crystals are used to form images.
Image flickering is there in CRT. So, they do not produce superior display quality.	Image flickering is not there in LCD. So, they offer a higher display quality level.

It is used only in personal computers.	Used in laptop computers, cellular phones.
It consumes more power.	It consumes less power.
CRT is cheaper than LCD.	LCD is costlier than CRT.
CRT emits harmful radiation.	LCD doesn't emit radiation.
CRT monitors are very bulky.	LCD monitors are very lightweight.
CRT has a fast response time of less than 1 microsecond.	LCD monitor has a high response rate of 1-8 milliseconds.

(b) "Latest word processor have text manipulation functions that extend beyond a basic ability to enter and change text ". Explain any four of these advanced text manipulation functions. 8

Ans: Word processing typically implies text manipulation functions that extend beyond a basic ability to enter and change text, such as automatic generation of:

footnote numbering and cross-referencing with section or page numbers: Automates the numbering and placements of footnotes and enables you to easily cross-reference other sections of the document.

tables of contents with section titles and their page numbers: Allows you to automatically create a table of contents and index based on special codes that you insert in the document.

Version control of a document using variables (e.g. model numbers, product names, etc.) : Version control features allow a user to track the various stages of editing that a document may pass through, including versions created by multiple users involved in the creation and editing of a document.

batch mailings using a form letter template and an address database (also called mail merging): Mail merge is the batch mailing of letters- using a letter template and a data file or address database. Instead of a business or college creating multiple copies of the same letter to send out in the post, one letter and one data file is created. The letter and data file are merged together - which means the names and address are automatically added to each of the letters and envelopes from the database or data file.

(c) Explain the characteristics of the following data transmission channels : 6

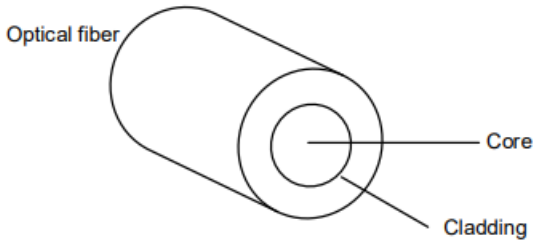
(i) Optic fiber cables (ii) Radio waves (iii) Infrared

i) Optic fiber cables:

Ans: An optic fiber cable is made of glass or plastic and transmits signals in the structure of light signals. An optical fiber consists of two concentric cylinders: an inner core surrounded by a cladding. Optical fiber use reflections to guide light through a channel. The density of the core and cladding must differ sufficiently to reflect the beam of light instead of refracting.

The core is used for guiding a light beam, whereas the cladding (which has a different refractive index) acts as a reflector to prevent the light signal instead of electrons, it does not suffer from the various noise problems associated with electromagnetic signals. The signal is usually generated by a laser or Light Emitting Diode (LED). Optical fibers can provide bandwidth to distance ratios in order of 100s of MHz per kilometer. Like other cables, hundreds of optical fibers are usually housed within one cable.

They are being increasingly used as telecommunication carriers for long distance digital trunk lines



The optic fiber cable provides more bandwidth as compared to copper. Therefore, it carries more data as compared to copper cable. Since, optic fiber cable carries data in the form of light, it can carry the signals at a higher speed. It is more reliable as it is immune to any temperature changes.

(ii) Radio waves

Ans: Radio waves are electromagnetic waves ranging in frequencies between 3 Kilo-Hertz and 1 Giga-Hertz.

Radio waves are easy to generate and can travel long distances and can penetrate buildings easily, therefore widely used for communication. These are omni-directional which implies that these travel in all directions from the source, so the transmitter and receiver do not have to be carefully aligned physically. A sending antenna sends waves that can be received by any receiving antenna. These signals have been used for a long time to transmit analog information. They are particularly attractive for long distance

communication over difficult terrain or across the oceans. Radio waves are used for various wireless communication technologies like Wi-fi, Bluetooth etc.

The omnidirectional property has a disadvantage, the radio waves transmitted by one antenna are susceptible to interference by another antenna that may send signals using the same band.

(iii) Infrared

Ans: Infrared signals range between 300 Giga-Hertz to 400 Tera-Hertz. These can be used for short range communication. High range infrared rays cannot be used for long range communication as it cannot penetrate walls. This also helps in avoiding interference. Infrared signals are generated and received using optical transceivers.

Infrared systems represent a cheap alternative to most other methods, because there is no cabling involved and the necessary equipment is relatively cheap. A short range communication system in one room cannot be affected by another system in the next room. For example, use of infrared remotes in one room do not interfere with the use of remote by neighbors. Infrared signals are useless for long-range communication. We cannot use infrared waves outside a building because rays of sun contain infrared which leads to interference in communication. Infrared signals supports high bandwidth and can be used to transmit digital data with a very high data rate.

4.

(a) List six activities that should be part of an e-learning system. Explain the phases of content development in e-learning. 6

Ans:

Some of the activities that should be a part of an e-learning process:

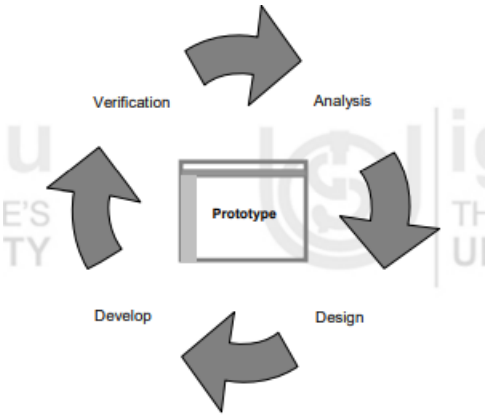
- Login.
- Content access and assimilation.
- Undertake formative assessment online.
- formative assessment using assignments and discussions.
- Getting the feedback on formative assessment and working towards achieving learning outcomes.
- Communication with the students through various means like email, chat, SMS, and other means.

- Go through a summative assessment.
- Measuring the effectiveness of e-learning and performance assessment.
- Recoding student achievements and certification.

Any e-learning project checks your achievements against a learning outcome; therefore, it starts with identification and verification process. The common process used for this purpose is the use of Username and Password. You are asked to login to the e-learning system before you start using it.

Once you are successfully logged in to the system. The e-leaning topics or contents are presented to your topic by topic. This content may include text, graphics, video, audio, animation, link to other references. In general, such content may be followed by some quiz or questions that try to access your understanding about the topic that you have studied. The e-learning systems may be a Learning Management System (LMS) or Content Management System (CMS) running as the base system. These systems help in recording information about you - such as time spent by you on a topic, marks scored by you in a feedback quiz etc. All such information may be sent to the content designer as feedback, who in turn may modify the content of the basis of 64 Internet Concepts the feedback so obtained. Thus, an e-learning system supported by LMS or CMS will have different types of users who will have different access rights. For example, a student may be allowed to see the contents of the courses s/he has registered for, his/her scores in various quizzes and assignments, whereas an instructor may login to correct the specific content, load an assignment for the student or a new video for the student, provide a link to a new important material, look into consolidated student response and identify weaknesses in the contents, identify the students who are defaulting and find ways to contact those students may be using SMS. Thus, technology provides several ways a teacher and a student can communicate with each other through the e-learning system. Please note that e-learning technologies are available in the present time, only that they need to be properly harnessed for the proper teaching learning process.

Different phases in content development process are:



Analysis Phase: Analysis requires identifying the learning objectives for the development of content for the target audience. This phase also lists the financial, technological and time constraints for the e-learning project. It also enables identification of the gap between the expected knowledge of the target audience and what they should know after going through the course. This facilitates the design phase.

Design Phase: In most organizations the design phase involves the development of a storyboard that may include a concept flow, text, graphics, video, audio, animation if needed. In this phase you may also design the basic questions that must be answered by the learner after going through the learning content. This step may also design the interface and interactivity.

Implementation Phase: Implementation phase brings the design to live course material. You may take the help of various experts for this phase including content expert, graphic expert, interaction designer, web designer etc.

Verification Phase: during the Verification phase the contents so produced can be tested to determine if it is conveying what it is expected to convey. It may also be used to check the usability features of the product.

(b) Compare and contrast the following : 8

(i) SRAM versus DRAM

Ans: Static RAM vs Dynamic RAM:

Static RAM	Dynamic RAM
Static RAMs retain stored information only as long as the power supply is on.	It stores information as long as the power is supplied or a few milliseconds when the power is switched off.

Six (6) transistors are needed per memory cell in a static RAM.	Dynamic RAMs required fewer transistors per memory cell.
These are expensive.	These are cheaper.
Consumes less power.	Consumes more power.
SRAM is faster compared to DRAM.	DRAM is slower when compared to SRAM.
These are used in cache memory.	These are used in main memory.
SRAM does not need to be refreshed.	DRAM requires the data to be refreshed periodically in order to retain the data.

(ii) SIMM versus DIMM

Ans:

SIMM	DIMM
SIMM stands for Single In-line Memory Module.	DIMM stands for Dual In-line memory Module.
In SIMM, Pins present in either facet are connected.	DIMM pins are freelance.
It supports 32 bit channel for data transfer.	It supports 64 bit channel for data transfer.
It consumes power of 5V.	It consumes power of about 3.3V.
SIMMs are the older technology.	DIMMs are the replacement of the SIMMs.
SIMMs are installed in pairs at a time.	DIMMs are installed one at a time.
SIMM has only one side that is usable at a time because it has only one set of connector.	DIMM has different usable pins at each side.

(iii) ROM versus PROM

Ans:

ROM	PROM
ROM stands for Read Only Memory.	PROM stands for Programmable Read Only Memory.
ROM is programmed during the manufacturing process.	PROM is manufactured as blank memory. PROM is programmed into them after manufacture .
ROM cannot be programmed by the user.	PROM can be programmed by the user.
It is a type of computer memory that can only be read from, not written to.	PROM allows you to write data to it a single time.

(iv) CD-ROM versus Pen - drive.

Ans:

CD-ROM	Pen-drive
A CD is a plastic disk that stores more than 600 MB data.	A pen drive is a small device that you put into a USB port and it can store upto 256 GB data.
CDs are prone to scratches. CDs can scratch easily, which can lead to data corruption or loss.	Pen drives are very durable and aren't prone to scratches.
The process of burning a CD (uploading files to a CD is known as burning) is slower when compared to pen-drive.	The process of uploading files to a Pen-drive is much faster and easier.
They have lower storage capacity.	They have higher storage capacity.
It is less portable compared to a pen-drive.	It is more portable because of its small size. It is small, lightweight, and easy to carry around.
CD-ROM can only be read by CD-ROM Readers. Normal readers cannot read the CD-ROM disks.	There is no need for extra software or complex set up procedures to use.
Most modern computers do not have CD and DVD burners.	USB ports are much more common than CD and DVD burners.
In case of CD-ROM, you can only add data once, and we can't remove data once it's burned into the disk.	Pen-drives are rewritable. We can add and delete files multiple times.
CD-ROMs are more sensitive to physical damages as they can be damaged more easily.	Pen-drives are more durable as they can withstand more drops and bumps than CDs.

(c) What is Open Source Software ? What are the main features of open source development model ? 6

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

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

There are two competing definitions.

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

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

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

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

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

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

The elements are:

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

Features of Open Source Development Model:

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.

5.

(i) The uses of WIKI in collaboration

Ans: WIKI is a collaborative platform that can be used in various ways to facilitate teamwork and information sharing. WIKI is a versatile tool that can enhance collaboration by enabling users to share knowledge, manage projects, document processes, train employees, and build a strong sense of community within a team or organization. Some of the key uses of WIKI in collaboration are:

* Knowledge Sharing: WIKI allows users to create, edit and update content collaboratively. This feature is especially useful for sharing information within a team or organization.

* Project Management : WIKI can be used as a project management tool to keep track of tasks, deadlines and progress. Team members can create pages for different projects, outline goals, assign responsibilities and provide updates in real-time. This helps in coordinating efforts and ensuring everyone is on the same page.

* Documentation: WIKI is an excellent platform for documenting processes, procedures and best practices. Team members can create and update documentation collaboratively, ensuring that information is always up-to-date and easily accessible to everyone. This is particularly beneficial for new team members who need to quickly get up to speed.

* Training and Onboarding : WIKI can also be used for training purposes., providing a central location for training materials, resources and guides.

* Community Building: WIKI can foster a sense of community among team members by providing a platform for discussions, feedback and collaboration. Users can engage in discussions, share ideas and provide feedback on project, creating a more connected and engaged team environment.

* It's open to everyone: There is enough content out there written by experts, and what makes a wiki special is that its open to everyone. This is a huge part of the reason why wikis are traditionally easy to use and simple in structure.

(ii) The activities/actions performed by a search engine.

Ans: A search engine performs, the following three actions:

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.

(iii) TCP/IP model.

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

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

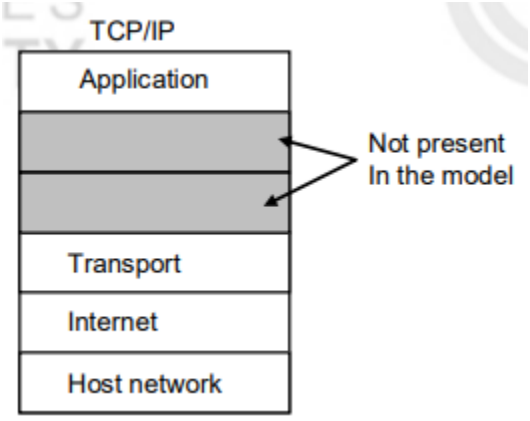
TCP/IP was originally designed for the UNIX operating system; however, TCP/IP software is now available for every major operating system. In order to be compatible to the Internet, the computer must have TCP/IP compatible software. The major advantage of Internet is information sharing. Since in computers,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

A stack of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol) implements these rules. Its name reflects names of only two protocols called TCP and IP. For sending large block of text/data to another machine, TCP divides the data into little data packets. It also adds special information e.g., the packet position, error correction code etc. to make sure that packets at the destination can be reassembled correctly and without any damage to data. The role of IP here is to put destination addressing

information on such packets. On Internet, it is not necessary that all the packets will follow the same path from source to destination. A router tries to load balance various paths that exist on networks. Other gateways allow different electronic networks to talk to Internet that uses TCP/IP.

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

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



Host to Host Network:

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

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

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

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

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

(iv) Activities in a project management software.

Ans: The different project management activities which can be performed using the Project Management Software are:

* 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.

* 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.

* Providing information

Project planning software provides information to various stakeholders of the project and can be used to measure and justify the level of effort required to complete the project. Typical information might include:

1. Tasks lists for team members

2. Allocation schedules for resources

3. Overview information on how long tasks will take to complete

4. Early warning of any risks to the project

5. Information on workload, for planning holidays

6. Historical information on how projects have progressed, and in particular, how actual and planned performance are related

7. Optimum utilization of available resources

* Timesheet Management

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.

(v) Batch systems and time sharing operating systems.

Ans:

Batch systems:

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

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

IBM introduces OS/360 as the operating system for its new System/360 in 1964. OD/360 provided a powerful language to expedite batch processing known as Job Control Language. It introduced a simple form of multiprogramming or multitasking feature that facilitated loading several jobs into main memory, so that other jobs programs could use the CPU when one job was busy with I/O. By this time, disks were also becoming available. To take its advantage the OS introduced features to cards onto disk while the CPU executed its jobs; thus, when a job completed, the OS could load another job from disk into memory, ready to run. This improved the OS scheduling capability. Multiprogramming or multitasking is the central theme of modern operating system.

Advantages of simple batch systems:

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

Disadvantages of simple batch systems:

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

Time sharing systems:

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

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

Advantages of time sharing operating system:

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

Disadvantages of Time Sharing Operating system:

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

(vi) Different types of parts in a computer.

Ans: 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.)

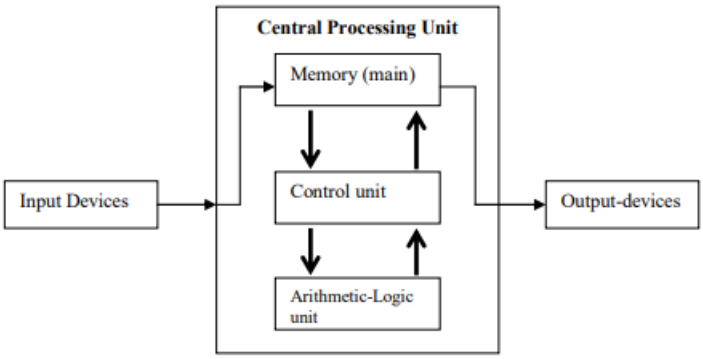
2. Processor (or CPU):

* 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

Relation of motherboard to basic computer system : Motherboard is a main component placed inside the computer case. Motherboard holds some of the most important component of the computer system. It is also known as system board, main board etc. in a typical computer microprocessor, main memory and other components are connected to the motherboard. It acts a s a base for other components. Motherboard also provides connectors for several other devices. A motherboard allows many different parts of our computer to receive power and communicate with one another. The Motherboards usually provides the interface between the CPU memory and input/output peripheral circuits, main memory, and facilities for initial setup of the computer immediately after power-on.

(vii) Concept of Instruction ; and motivation for development of UNICODE.

Ans: Concept of Instruction

An instruction refers to an operation that can be performed by the processor directly. The entire set of instructions that can be executed by the processor directly, through the logic in hardware, form the instruction set of the processor. An instruction tells the processor what task is to be performed and what microoperations need to be completed to perform the task. Every instruction execution requires execution of a set of arithmetic and logical operations (micro-operations). The size and format of the instruction varies with different processors.

Every instruction is comprised of two parts: opcode and operands. The opcode specifies the operation to be performed and the operands provide the data on which the operation is to be performed.

A simple instruction can be written as a combination of an opcode and its associated operands. Opcode is denoted by its unique binary code. The operands are decimal digits and therefore also need to be converted to binary code system to pass them as operands to the processor.

Execution of a machine instruction on modern processors involves a complex sequence of operations with multiple cycles. One instruction cycle typically involves Fetch, Decode, Execute and Write back cycles. During Fetch cycle the instruction is fetched from memory. During Decode cycle the instruction is processed by the control unit of the CPU, which generate the set of micro-operations and timing signals required to execute the instruction. The micro-operations are then executed during Execute cycle to complete the instruction and any results generated are then written back to memory during Write back

cycle. An instruction cycle may also involve one or more operand fetch cycles. The control unit is responsible for overall control and coordination of instruction execution. It generates the set of micro-operations either through a hard-wired logic or with the help of micro program sequencer. Executing a program therefore involves executing a large number of machine instructions, where every machine instruction execution requires executing several micro-operations.

Motivation for development of UNICODE :

Unicode was developed as a standard for the consistent encoding, representation and handling of text expressed in most of the world's writing systems. Unicode consists of a repertoire of more than 107,000 characters covering 90 scripts. It is the universal encoding scheme having special significance for Internet and multilingual computing.

Unicode's development is motivated by the need to encode characters in all languages without conflicts between the encodings for different languages.

Unicode is a standard that aims to unify all human languages, both past and present and make them work with computers.

Another main motivation for its development was the need to have a single –character encoding standard that could be used to represent text in any language. To solve this problem, the Unicode consortium was formed, to create a single , universal character encoding standard that could represent all the world's languages.