UNIT –I

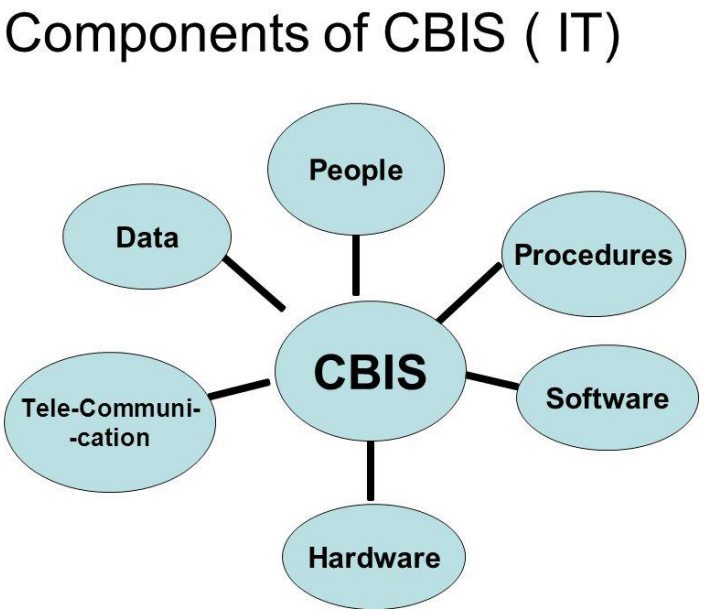
1	Briefly explain the different elements that are made of a computer-based information system.	[L2][CO1]	**[12M]**

Answer:

EXPLANATION-10M
DIAGRAM-2M

Information System:

- Information system, an integrated set of components for collecting, storing, and processing data and for delivering information, knowledge, and digital products.
- Business firms and other organizations rely on information systems to carry out and manage their operations, interact with their customers and suppliers, and compete in the marketplace.



Computer-based information system(CBIS):

- In Information Systems "computer-based" means that the computer plays an important role in an information system.
- It uses computers to collect, process, store, analyze and distribute information for a specific purpose, such as meeting a business objective.

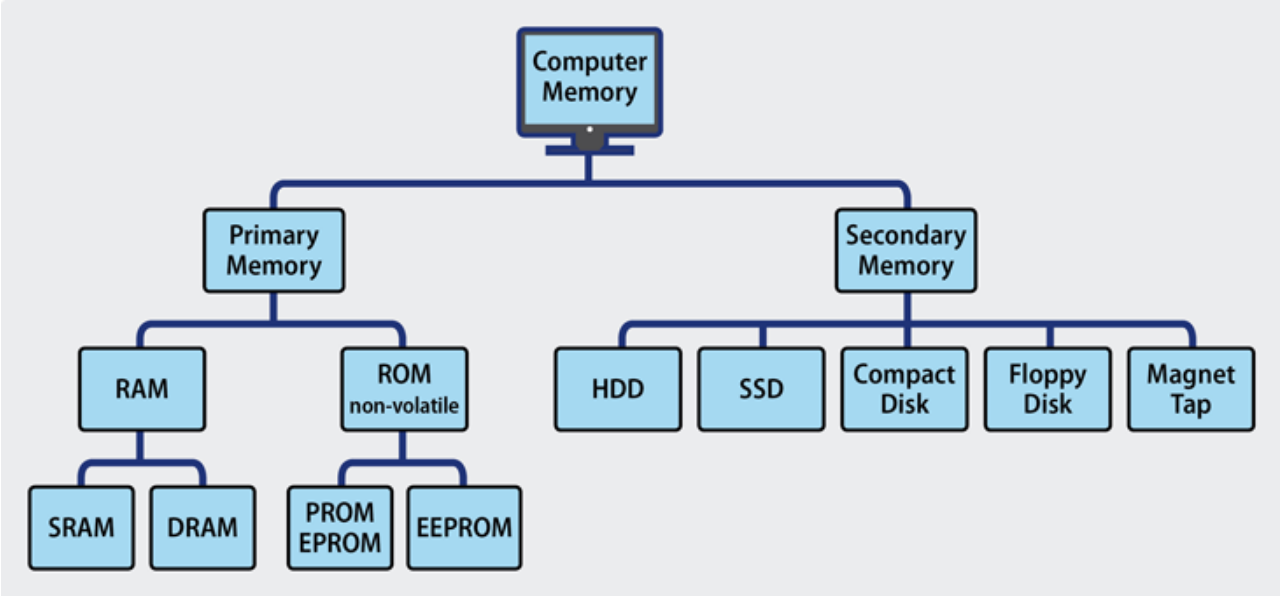
Functions CBIS:

- Input: Consists of raw data either from organization or outside the organization to be processed
- Process: Transfer raw data into useful information
- Output: Information that has been processed
- Storage: A place to store the useful information
- Control: Control the evolving of information system

Elements of computer based information system:

Computer Based Information System (CBIS) is an information system in which the computer plays a major role. Such a system consists of the following elements:

	• HARDWARE: The term hardware refers to machinery. This category includes the computer itself, which is often referred to as the central processing unit (CPU), and all of its support equipment. Among the support equipment are input and output devices, storage devices and communications devices. • SOFTWARE: The term software refers to computer programs and the manuals (if any) that support them. Computer programs are machine-readable instructions that direct the circuitry within the hardware parts of the Computer Based Information System (CBIS) to function in ways that produce useful information from data. Programs are generally stored on some input / output medium- often a disk or tape. • DATA: Data are facts that are used by program to produce useful information. Like programs, data are generally stored in machine- readable form on disk or tape until the computer needs them. It may be consists of numbers, characters, symbols or picture. • PROCEDURES: Procedures are the policies that govern the operation of a computer system. "Procedures are to people what software is to hardware" is a common analogy that is used to illustrate the role of procedures in a CBIS. • HUMAN RESOURCES/PEOPLE: People are required for the operation of all information system. Every Computer Based Information System (CBIS) needs people if it is to be useful. Often the most over-looked element of the CBIS is the people. probably the components that most influence the success or failure of information system. • COMMUNICATIONS: Electronic transmission of signals for communications and enables organizations to link computer systems into effective networks. Strategic use of information Technology The role of information and information systems has changed dramatically in the past last twenty years. The adoption of computer based information systems have strategic consequence for organizations.		
2	Distinguish primary storage and secondary storage. What is each type used for?	[L2][CO1]	**[12M]**
	Answer: **EXPLANATION-8M** **DIAGRAM-4M** The key difference between primary and secondary memory is speed of access. • Primary memory includes ROM and RAM, and is located close to the CPU on the computer motherboard, enabling the CPU to read data from primary memory very quickly indeed. It is used to store data that the CPU needs imminently so that it does not have to wait for it to be delivered. • Secondary memory by contrast, is usually physically located within a separate storage device, such as a hard disk drive or solid state drive (SSD), which is connected to the computer system either directly or over a network. The cost per gigabyte of secondary memory is much lower, but the read and write speeds are significantly slower. Primary Memory Types: RAM and ROM There are two key types of primary memory: RAM, or random access memory ROM, or read-only memory		



1) RAM Computer Memory

The acronym RAM stems from the fact that data stored in random access memory can be accessed – as the name suggests – in any random order. Or, put another way, any random bit of data can be accessed just as quickly as any other bit.

The most important things to understand about RAM are that RAM memory is very fast, it can be written to as well as read, it is volatile (so all data stored in RAM memory is lost when it loses power) and, finally, it is very expensive compared to all types of secondary memory in terms of cost per gigabyte. It is because of the relative high cost of RAM compared to secondary memory types that most computer systems use both primary and secondary memory.

Types of RAM: SRAM & DRAM

The key differences between DRAM and SRAM is that SRAM is faster than DRAM – perhaps two to three times faster – but more expensive and bulkier. SRAM is usually available in megabytes, while DRAM is purchased in gigabytes.

DRAM uses more energy than SRAM because it constantly needs to be refreshed to maintain data integrity, while SRAM – though volatile – does not need constant refreshing when it is powered up.

2) ROM Computer Memory

ROM stands for read-only memory, and the name stems from the fact that while data can be read from this type of computer memory, data cannot normally be written to it. It is a very fast type of computer memory which is usually installed close to the CPU on the motherboard.

ROM is a type of non-volatile memory, which means that the data stored in ROM persists in the memory even when it receives no power – for example when the computer is turned off. In that sense it is similar to secondary memory, which is used for long term storage.

ROM is also used in simpler electronic devices to store firmware which runs as soon as the device is switched on.

Types of ROM

ROM is available in several different types, including PROM, EPROM, and EEPROM.

- PROM PROM stands for Programmable Read-Only Memory, and it is different from true ROM in that while a ROM is programmed (i.e. has data written to it) during the manufacturing process, a PROM is manufactured in an empty state and then programmed later using a PROM programmer or burner.
- EPROM EPROM stands for Erasable Programmable Read-Only Memory, and as the name suggests, data stored in an EPROM can be erased and the EPROM reprogrammed. Erasing an EPROM involves removing it from the computer and exposing it to ultraviolet light before re-burning it.
- EEPROM EEPROM stands for Electrically Erasable Programmable Read-Only Memory, and the distinction between EPROM and EEPROM is that the latter can be erased and written to by the computer system it is installed in. In that sense EEPROM is not strictly read-only. However in many cases the write process is slow, so it is normally only done to update program code such as firmware or BIOS code on an occasional basis

Secondary Memory Types

The secondary memory is also known as external memory or auxiliary memory. Unlike primary memory, secondary memory is generally volatile and they tend to process data slower than primary memory. The secondary is comparably less important than primary memory since they're basically extra storage for more data. These include:

- hard disk drives
- solid state drives (SSDs)
- Optical (CD or DVD) drives
- Tape drives
- Floppy disks

Secondary memory also includes:

- Storage arrays including 3D NAND flash arrays connected over a storage area network (SAN)
- Storage devices which may be connected over a conventional network (known as network attached storage, or NAS)

Arguably cloud storage can also be called secondary memory.

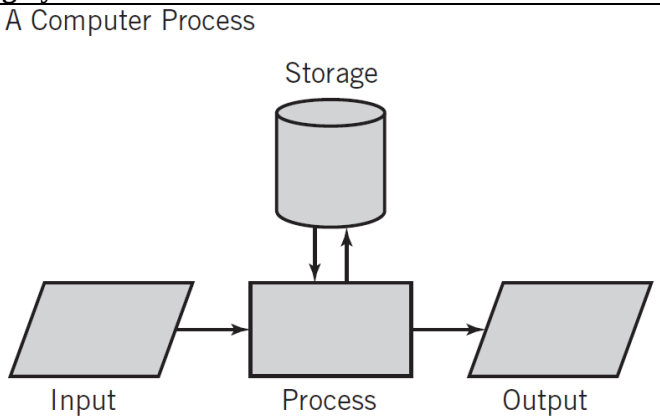
3	**a**	Sketch the IPO model and describe its functional blocks.	[L3][CO2]	**[6M]**

Answer:

EXPLANATION-4M
DIAGRAM-2M

The work performed by an individual computer system within the IT system can be characterized by input, processing, and output. This characterization is often represented by the **Input-Process-Output (IPO) model** shown in Figure. Storage is also represented within this model. Alternatively, storage can be interpreted as output to be saved for use as future input. Storage is also used to hold the software programs that determine the processing operations to be performed.

The ability to store programs and data on a temporary, short-term, or long-term basis is fundamental to the system. The IPO model provides an important basic tool for system analysis and design practices.



The components of an individual computer system consist of processing hardware, input devices, output devices, storage devices, application software, and operating system software. The task of the operating system software is to provide overall control of the individual system, including management of input, output, and file storage functions. The medium of exchange, both with users and between computers within a larger system, is data.

b	Justify why Protocols and standards are an important feature of networks	[L5][CO3]	**[6M]**

Answer:

STANDARDS EXPLANATION-3M
PROTOCOLS EXPLANATION-3M

Standards and protocols are of great importance in computer systems. New protocols and other standards are proposed and created and standardized as the need arises.

Standards:

- Standards are agreements among interested parties, often manufacturers, to assure that various system components will work together interchangeably.
- Standards make it possible to build a computer with components from different suppliers.
- Standards apply to every aspect of computing: hardware, software, data, and communications; the voltage of a power supply; the physical spacing of pins on a connector; the format of a file; and the pulses generated by a mouse.
- Computer language standards, such as Java and SQL, allow programs written on one type of computer to execute properly and consistently on another, and also make it possible for programmers to work together to create and maintain programs.
- Similarly, data format and data presentation standards, such as the PNG and JPEG image format standards, the Unicode text format standard, and the HTML and XML Web presentation standards, allow different systems to manipulate and display data in a consistent manner.

Protocols:

- Protocols define the specific agreed-upon sets of ground rules that make it possible for a communication to take place.
- Protocols exist for communications between computers, for the communications between various I/O devices and a computer, and for communications between many software programs.
- A protocol specification defines such communication features as data representation, signaling characteristics, message format, meanings of messages, identification and authentication, and error detection.

- Protocols in a client–server system assure that requests are understood and fulfilled and that responses are interpreted correctly.
- Examples as, HTTP, HyperText Transfer Protocol, guides communication between Web servers and Web browsers on the Internet. The movement of data through the Internet is controlled by a suite of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol).
- Storage devices communicate with a computer using a protocol called SATA. There are thousands of such protocols.

4	**a**	Interpret the concept of virtualization and describe its importance.	[L2][CO3]	**[6M]**

Answer:

EXPLANATION-6M

Virtualization:

- Virtualization is the process of creating a virtual version of something like computer hardware. It involves using specialized software to create a virtual or software-created version of a computing resource rather than the actual version of the same resource.
- Virtualization uses software to create an abstraction layer over computer hardware that allows the hardware elements of a single computer—processors, memory, storage and more—to be divided into multiple virtual computers, commonly called virtual machines (VMs).
- Each VM runs its own operating system (OS) and behaves like an independent computer, even though it is running on just a portion of the actual underlying computer hardware.
- It follows that virtualization enables more efficient utilization of physical computer hardware and allows a greater return on an organization's hardware investment.

Importance of Virtualization:

The many benefits of virtualization are driving its growth. Understanding these benefits also often answers the question of why to virtualize.

- Server consolidation: Traditionally, a business decision to purchase and install a server was driven by factors such as resources need, stability, and security. Using different servers provided load balancing by providing plenty of resources to every critical service and application. Additionally, being on different servers meant that if one server was compromised, the other could continue running. With virtualization, the same benefits can be realized on a single piece of hardware. Servers are still completely isolated by virtual machines, and servers no longer need be oversized.
- Energy consumption: Each new server draws more power to run its processor and other hardware. In addition, each of those components generates heat, which must be drawn away, usually via fans and air conditioning. Adding virtual machines adds no extra hardware, requiring no additional power or cooling.
- Better availability: Virtual machines are easily duplicated. This makes it easy both to create new copies of the same system, but also as a way to improve availability. Instead of scheduling downtime on the weekend, to install patches or upgrade a system, administrators can install the patches or upgrades on a copy of the running virtual machine, and then swap the old virtual machine out for the newly upgraded machine.
- Disaster recovery: Snapshots of virtual machines offer a way to create or return a system to its exact state without the need to return to the same hardware. As a result, snapshots offer a

great form of disaster recovery. Should something happen to an entire data center, the whole operation could theoretically be quickly restored by spinning up new virtual machines in a new location using snapshots of the original systems.

b	Discuss about early history and development of modern computer systems.	[L2][CO1]	**[6M]**

Answer:

EXPLANATION-6M

- The abacus, already in use as early as 500 BC by the ancient Greeks and Romans, to be an early predecessor of the computer.
- Blaise Pascal, a noted French mathematician of the 1600s, invented a calculating machine in 1642.
- In 1801, Joseph Marie Jacquard invented a loom that used punched cards to control the patterns woven into cloth.
- Charles Babbage, an English mathematician who lived in the early 1800s, attempted to build a mechanical calculating machine that he called an “analytical engine”.
- In the late 1930s and early 1940s, several different groups of researchers independently developed versions of the modern electronic computer.
- The Mark I, built in 1937 by Howard H. Aiken and associates at Harvard University with help and funding from IBM, used thousands of mechanical relays; relays are binary switches controlled by electrical currents to perform Boolean logic.
- The first totally electronic digital computer was apparently devised by John V. Atanasoff, a physicist at Iowa State College, in 1937.
- A need for the solution to difficult mathematical formulas related to ballistic missile trajectories and other World War II research is ENIAC.
- The ENIAC (for Electronic Numerical Integrator and Computer, believe it or not) is generally considered to be the first all-electronic digital computer. It was designed and built between 1943 and 1946 by John W. Mauchly and J. Presper Eckert at the University of Pennsylvania, using the concepts that Mauchly had seen in Atanasoff’s machine.
- John von Neumann improvised ENIAC and developed EDVAC and IAS systems,\they refreed this architecture of this systems as Von Neumann architecture.
- It to the development of many several commercial computers, including the first IBM computers.
- All of these early electronic computers relied on the electronic vacuum tube for their operation.
- The technological breakthrough that made possible today’s small, sophisticated computers was the invention of the transistor and, subsequently, the integration of transistors and other electronic components with the development of the integrated circuit.
- Although many of these computers played an important role in the evolution of today’s computers, two specific developments stand out from the rest: (1) development of the first widely accepted personal computer, by IBM in 1981, and (2) design of the Intel 8008 microprocessor, predecessor to the x86 CPU family, in 1972.
- The impact of these two developments is felt to this day. Even smartphones and other mobile devices reflect these developments. Nonetheless, the basic architecture of today’s machines is remarkably similar to that developed in the 1940s.

5	**a**	List the components of a computer system.	[L1][CO1]	**[2M]**

Answer:

FOUR COMPONENTS LIST-2M

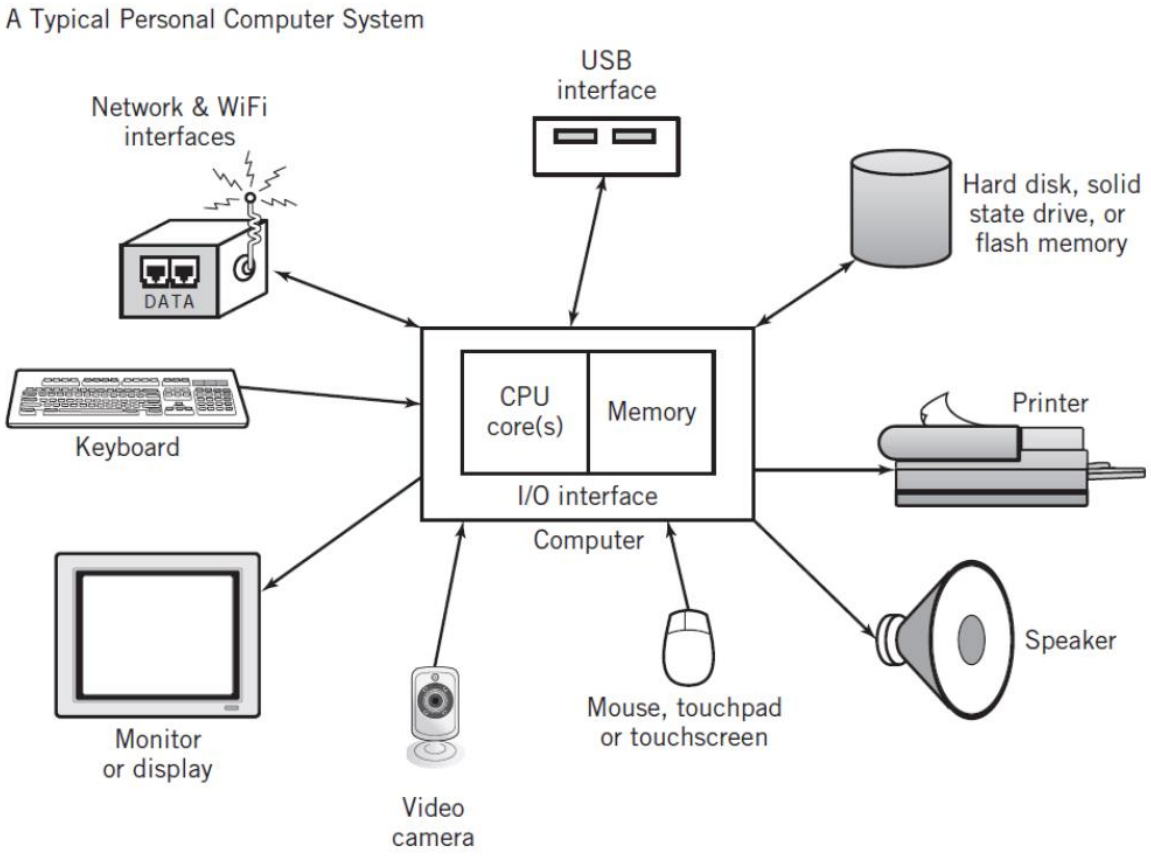
Components of computer system:

1. The computer hardware
2. The Software
3. The data
4. The communication component

	b	With the help of a neat block diagram explain the hardware component of computer system	[L2][CO1]	**[10M]**

Answer:

EXPLANATION-6M
DIAGRAM-4M



- The most visible part of the computer system is obviously the hardware that makes up the system.
- Consider the computer system upon which you write and execute your programs. You use a keyboard or touch screen and a pointing device to provide input of your program text and data, as well as for commands to the computer.
- A display screen is commonly used to observe output. A printer is frequently available as an alternative output to the screen. These are all physical components.
- Calculations and other operations in your program are performed by one or more central processing units (CPUs), or "cores" inside the computer.
- Memory is provided to hold your programs and data while processing is taking place.
- Other input and output devices, such as a disk and SD plug-in cards, are used to provide long-term storage of your program and data files.

- Data and programs are transferred between the various input/output (I/O) devices and memory for the CPUs to use.
- The CPUs, memory, and all the input, output, and storage devices form the hardware part of a computer system. A typical hardware block diagram for a computer is seen in Figure.

Conceptually, a CPU itself is often viewed as a composition of three primary subunits:

1. The arithmetic/logic unit (ALU) where arithmetic and Boolean logical calculations are performed.
2. The control unit (CU), which controls the processing of instructions and the movement of internal CPU data from one part of the CPU to another.
3. The interface unit, which moves program instructions and data between the CPU and other hardware components.

- The interface unit interconnects the CPU with memory and also with the various I/O modules. It can also be used to connect multiple CPU cores together.
- In many computer systems, a bus interconnects the CPU, memory, and all of the I/O components. A bus is simply a bundle of wires that carry signals and power between different components. In other systems, the I/O modules are connected to the CPU through one or more separate processors known as channels.
- The main memory, often known as primary storage, working storage, or RAM(for random access memory), holds programs and data for access by the CPU. The amount of primary storage determines the maximum number of instructions and data words that can be loaded into memory from a peripheral device at one time.
- The same is true for secondary storage. Even small personal computers provide long term storage using hard disks or solid stage storage devices with storage measured in tens or hundreds or thousands of gigabytes

6	**a**	Briefly explain the communication component of a computer system	[L2][CO1]	**[5M]**

Answer:

EXPLANATION-5M

- Very few modern computers or computer-based devices operate independently. Instead, they are tied to other computers directly, by modem, or through a network connection of some sort.
- The computers may be located physically close to each other, or they may be separated, even by thousands of miles.
- To work together, computers must have means to communicate with each other. The communication component requires both hardware and software to achieve this goal.
- Additional hardware components physically connect computers together into multiprocessing systems, or clusters, or networks, or, via telephone, satellite, microwave, or other network technology, to computers at other remote locations.
- A communication channel provides the connection between computers.
- The channel may be a wire cable, a fiber-optic cable, a telephone line, or a wireless technology, such as infrared light, cellular phone, or radio-based technology such as Wi-Fi or Bluetooth.

- Special I/O hardware, consisting of a device such as a modem or network interface card (NIC) within the computer, serves as an interface between the computer and the communication channel. There may be additional hardware within the channel itself.
- The communication component also requires additional software within the operating system of each computer to make it possible for each computer to understand what the other computers that they are connected with are saying.
- This software establishes the connections, controls the flow of data, and directs the data to the proper applications for use.

b	What are the major considerations and factors that would be important while buying a computer? Justify your answer.	[L5][CO1]	**[7M]**

Answer:

EXPLANATION-7M

Below are factors to consider before buying your computer;

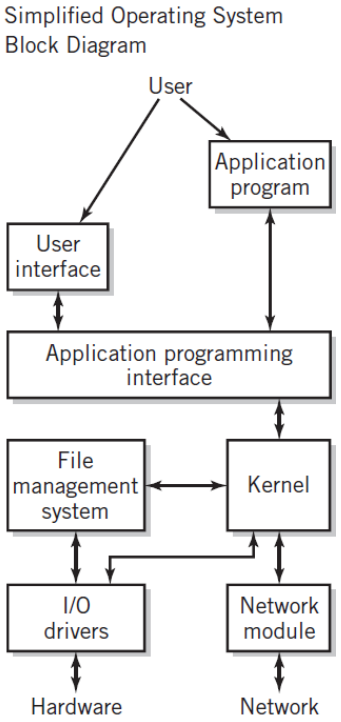
1. **Usability** – When buying a computer the first thing that you need to consider is the purpose of that computer, whether it is for just browsing and internet or for heavy video editing and professional work. If it is simply for browsing the ideal computer is single core but if it is for professional and complicated tasks you need an enhanced multimedia option.

2. **Price** – The cost of a computer is also very important because this again will depend on your affordability. If the finances are available it is advisable that you buy a computer with high specifications but if you are financially constrained a computer with the low specification is also an option since they are quite affordable.
3. **Operating System**–It is advisable that users with minimal requirements may use windows starters and users who need enhanced features use professional editions of windows or linux OS.
4. **Size** – When buying a computer you need consider whether it is purely for office work or both office and personal work. If it is purely for office work you can consider buying a desktop and if it is for both personal and office works a laptop is ideal due to its portability. Considering size is also important due to the available space in the office
5. **Processor**–A processor is what defines a good or bad machine. It is the processor that determines a machine that hangs frequently and a machine that runs smoothly. For the best processor look for Core I5/I7/I9.
6. **Peripherals** – This refers to gadgets like printer, scanner, camera and other peripherals that are usually connected to the computer. Before buying a computer ensure it is compatible with the gadgets that you have in the office/home.
7. **Hard Drive Capacity and Speed**– This is an electronic data storage device. If we have a large amount of data to store on your PC, then it is recommend using a minimum 500 GB for general usage. Depending on your needs you may use 1 TB, 2 TB, or even 4 TB hard drives or add SSD for faster read and writes.
8. **RAM** – This refers to Random Access Memory. RAM is like the temporary scratchpad or canvas where a PC performs its real-time operations and calculations. The more the RAM in a computer is, the better performance the computer enjoys. It is recommended that to have minimum 4GB of RAM.
9. **Warranty** – It is very important to consider the period of warrant since computers are expensive and delicate and in case of breakdown it would mean a total loss to the buyer. At times you might find it is not your fault but the problem originated from the manufacturer.

7	Illustrate and describe the two major categories of software component of a computer system.	[L2][CO1]	**[12M]**

Answer:

EXPLANATION-8M
DIAGRAM-4M



In addition to the hardware requirement, your computer system also requires software. Software consists of the programs that tell the computer what to do. To do useful work, your system must execute instructions from some program.

There are two major categories of software:

1. System software
2. Application software.

- System software helps you to manage your files, to load and execute programs, and to accept your commands.
- The system software programs that manage the computer are collectively known as an operating system, and differ from the application programs, such as Microsoft Word, or Firefox, or the programs that you write, that you normally run to get your work done.
- Windows, Linux, MAC OS X, iOS, and Android are the best known examples of an operating system. Others include Unix, Oracle Solaris, and IBM z/OS.
- A simplified representation of an operating system is shown in Figure. The most obvious element is the user interface that allows you to execute programs, enter commands, and manipulate files.
- The user interface accepts input from a keyboard and, in most modern systems, a mouse, touch screen, or other pointing device. The user interface also does output presentation on the display.
- The operating system's application programming interface (API), acts as an interface for application programs and utilities to access the internal services provided by the operating system. These include file services, I/O services, data communication services, user interface services, program execution services, and more.

- Many of the internal services are provided by the kernel module, which contains the most important operating system processing functions. The remaining services are provided by other modules that are controlled by the kernel.
- The kernel manages memory by locating and allocating space to programs that need it, schedules time for each application to execute, provides communication between programs that are being executed, manages and arranges services and resources that are provided by other modules, and provides security.
- The file management system allocates and manages secondary storage space and translates file requests from their name-based form into specific I/O requests.
- The actual storage and retrieval of the files is performed by the I/O drivers that comprise the I/O component of the operating system. Each I/O driver controls one or more hardware devices of similar type.
- The network module controls interactions between the computer system and the network(s) to which it is attached.
- Traditionally, the operating system software has nearly always been stored on a hard disk, but on some smaller modern systems, especially lightweight laptops and embedded systems such as cell phones, tablets, and E-books, a solid-state disk or SD card is normally used instead.
- On a few systems the operating system is actually provided as a network or cloud-based service when the system is turned on.
- In either case, the bootstrap or IPL (Initial Program Load) program in the operating system is stored within the computer using a type of memory known as ROM, or read-only memory.
- The bootstrap program provides the tools to test the system and to load the remainder of the operating system from the disk or network.

8	**a**	List the types of computers and write short notes of each computer.	[L1][CO1]	**[7M]**

Answer:

LIST OF COMPUTER TYPES-2M
EXPLANATION-5M

Computers can be generally classified by size and power as follows,

- Personal computer
- Workstation
- Minicomputer.
- Mainframe
- Supercomputer

Personal computer: It can be defined as a small, relatively inexpensive computer designed for an individual user. All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is for playing games and recently for surfing the Internet.

Workstation: It is a type of computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other types of applications that require a moderate amount of computing power and relatively high quality graphics capabilities. Workstations generally come with a large, high-resolution graphics screen, at large amount of RAM, built-in network support, and a graphical user interface. The most common operating systems for workstations are UNIX and Windows NT.

Minicomputer: It is a midsize computer. In the past decade, the distinction between large minicomputers and small mainframes has blurred, however, as has the distinction between small minicomputers and workstations. But in general, a minicomputer is a multiprocessing system capable of supporting from up to 200 users simultaneously.

Supercomputer: Supercomputer is a broad term for one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations (number crunching). For example, weather forecasting requires a supercomputer. Other uses of supercomputers scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting).

Mainframe: Mainframe is a very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. The chief difference between a supercomputer and a mainframe is that a supercomputer channels all its power into executing a few programs as fast as possible, whereas a mainframe uses its power to execute many programs concurrently. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe.

b	Describe the features of IBM -Z series mainframe computers.	[L2][CO1]	**[5M]**

Answer:

FEATURES-5M

The zSeries, zEnterprise, System z and IBM Z families were named for their availability – z stands for zero downtime. The systems are built with spare components capable of hot failovers to ensure continuous operations. IBM z15 is the new mainframe computer which is industry leading privacy and resiliency for mission critical workloads in the hybrid multi cloud.

Features of Z-15 series computer:

- IBM z15, machine type 8561, provides a scalable, highly available platform that delivers differentiated value to enable business growth, reduce cost, and protect existing investments.
- The IBM z15 platform provides the hardware infrastructure, in a balanced system design, with the encryption capabilities that now make it possible to create a fortified perimeter around critical business data.
- It runs at 5.2GHz processor frequency
- It offers 8TB memory per CPC (Central Processing Complex) drawer for up to 40TB per machine
- 85 partitions, and up to 190 cores to configure
- IBM z15 also offers IBM Virtual Flash Memory (VFM),
- IBM z15 also offers System Recovery Boost, the Integrated Accelerator for z Enterprise Data Compression, and IBM Z Data Privacy Passports.

9	**a**	Interpret the following terms: (i) Computer network (ii) Internet	[L2][CO3]	**[4M]**

Answer:

1M EACH DEFINITION -2M

(i) **A computer network** is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

(ii) **Internet** is a global network that connects billions of computers across the world with each other and to the World Wide Web. It uses standard internet protocol suite (TCP/IP) to connect billions of computer users worldwide. It is set up by using cables such as optical fibers and other wireless and networking technologies.

	b	List the applications of a computer network.	[L1][CO1]	**[2M]**

Answer:

ANY FOUR APPLICATIONS -2M

Applications of a computer network:

- Resource Sharing.
- VPNs (Virtual Private Networks).
- Client-Server Model,
- Web Application.
- Communication Medium Between Employees.
- IP Telephony. Voice over IP (VoIP).
- Desktop Sharing.
- E-Commerce (Electronic Commerce).
- Peer-to-peer Communication.
- Social Networks.
- Facebook
- Wireless Hotspots.
- Fixed Wireless and Mobile Wireless.
- Text Messaging.

	c	Discuss the various types of network media, network hardware and protocols.	[L2][CO1]	**[6M]**

Answer:

NETWORK MEDIA EXPLANATION -2M
NETWORK HARDWARE EXPLANATION -2M
PROTOCOLS EXPLANATION -2M

Network media

- Network media refers to the communication channels used to interconnect nodes on a computer network.
- Typical examples of network media include copper coaxial cable, copper twisted pair cables and optical fiber cables used in wired networks, and radio waves (Wi-Fi, Zigbee, LoRA, Bluetooth, RFID, NFC etc) used in wireless data communications networks.

Network hardware

	• Networking hardware, also known as network equipment or computer networking devices, are electronic devices which are required for communication and interaction between devices on a computer network. Specifically, they mediate data transmission in a computer network. • Core network components interconnect other network components are Gateway, router, switch, bridge, repeater, repeater hub • Hybrid components can be found in the core or border of a network are- Multilayer switch, protocol converter, bridge router • Other hardware devices used for establishing networks or dial-up connections include: Network interface controller, wireless network interface controller, modem, line driver terminal adapter **Protocols:** • The protocol defines the rules, syntax, semantics and synchronization of communication and possible error recovery methods. Protocols may be implemented by hardware, software, or a combination of both. • There are various types of protocols that support a major and compassionate role in communicating with different devices across the network. These are: Transmission Control Protocol (TCP), Internet Protocol (IP), User Datagram Protocol (UDP), Post office Protocol (POP), Simple mail transport Protocol (SMTP), File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), Hyper Text Transfer Protocol Secure (HTTPS), Telnet, Gopher		
10	**a**	Describe the early work for the development of modern operating systems.	[L1][CO1]	**[6M]**
	Answer: **EXPLANATION -6M** • The first operating system was built by General Motors Research Laboratories in 1953–1954 for their IBM 701 computer. • In 1963, Burroughs released its Master Control Program (MCP). MCP contained many of the features of modern systems, including high-level language facilities and support for multiprocessing (with two identical CPUs). Most important, MCP supported virtual storage, as well as powerful multitasking capabilities. • IBM introduced OS/360 as the operating system for its new System/360 in 1964. OS/360 provided a powerful language to expedite batch processing, JCL, or Job Control Language, and a simple form of multiprogramming that made it possible to load several jobs into memory, so that other jobs could use the CPU when one job was busy with I/O. • In 1962, a group at MIT known as Project MAC introduced the concept of time-sharing with an experimental operating system called CTSS. Project MAC was one of the seminal centers for the development of computer science. • Shortly thereafter, MIT, Bell Labs, and GE formed a partnership to develop a major time-sharing system. The system was called MULTICS (Multiplexed Information and Computing Service). • It was supplied for many years as the operating system for Honeywell computer systems. When Bell Labs withdrew from the MULTICS project, Ken Thompson, a MULTICS researcher, turned to the development of a small personal operating system, which he called Unics, later UNIX, to contrast it from MULTICS.			

- He was later joined by Dennis Ritchie. Originally, the system was written in assembly language, but Ritchie developed a new high-level language, which he called C, and the operating system was largely rewritten in C.
- UNIX earned a reputation for power and flexibility. Because it was written in C, it was also easy to port it, that is, convert it for use, to other computers. As a result of these factors, UNIX became an important operating system for universities and was ultimately adopted, in many versions, by the commercial marketplace as well.
- UNIX and its direct derivatives, FreeBSD, Linux, and Android, continue to be of great importance, particularly due to UNIX's flexibility in the area of networks and distributed systems.
- Even with all these earlier innovations, there continue to be tremendous advances in operating system software. Today's systems, such as Windows 7 and 8, Linux and Android, and Macintosh OS X and iOS, combine much more power on one hand with improved user friendliness and ease of use on the other

b	For the computer that you normally use, identify which pieces constitute the hardware and which pieces constitute the system software. Now think about the file system of your computer. What part of the file system is hardware, what part software, and what part data? Explain.	[L4][CO1]	**[6M]**

Answer:

EXPLANATION -6M

Hardware:

Here are some common individual computer hardware components that you'll often find inside a modern computer. These parts are almost always found inside the computer's case.

- Motherboard
- Central Processing Unit (CPU)
- Random Access Memory (RAM)
- Power Supply
- Video Card
- Hard Drive (HDD)
- Solid-State Drive (SSD)
- Optical Drive (e.g., BD/DVD/CD drive)
- Card Reader (SD/SDHC, CF, etc.)

Here is some common hardware that you might find connected to the *outside* of a computer, although many tablets, laptops, and netbooks integrate some of these items into their housings:

- Monitor
- Keyboard
- Mouse
- Battery Backup (UPS)
- Flash Drive
- Printer
- Speakers
- External Hard Drive
- Pen Tablet

System Software:

System software is a type of computer program that is designed to run a computer's hardware and application programs. The operating system is the best-known example of system software. Essentially we need to store the operating system in our computer. In hard disk/drive we will store and the load the OS.

	File System: A file system defines how files are named, stored, and retrieved from a storage device. Here the storage device is hardware, which is nothing but hard disk/drive. **Software/Program and Data:** Software is a set of programs with series of commands that is typically designed and implemented to process information or execute a task or automate things. Data is information that is designed for machine consumption. In our computer we will store photos, documents, videos, software etc in the folders. Here we use file system to access, modify or delete the information in the folders. In this example programs that we stores and run in the folders is nothing but software and photos, videos, documents etc are data.