

SECTION 'A' – HARDWARE

Q. 2 (a) DIFFERENCE BETWEEN ANALOG AND DIGITAL COMPUTERS:

Analog Computers:

These computers recognize data as a continuous measurement of a physical property. Their output is usually in the form of readings on dials or graphs. Voltage, pressure, speed and temperature are some physical properties that can be measured in this way.

Digital Computers:

These are high speed programmable electronic devices that perform mathematical calculations, compare values, and store the results. They recognize data by counting discrete signals representing either a high ('on') or low ('off') voltage state of electricity. Numbers, alphabets and special symbols can all be reduced to representation by 1s and 0s.

Hybrid Computers:

Hybrid computers combine the best features of analog and digital computers. They have the speed of analog computers and the accuracy of digital computers. They are usually used for special problems in which input data derived from measurements is converted into digits and processed by computer.

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Q. 2 (b) **Optical Disk:**

As compared to magnetic tape and magnetic disk, optical disk is a relatively new secondary storage medium. During the last few years, it has proved to be a promising random access medium for high capacity secondary storage because it can store extremely large amount of data in a limited space.

An optical-disk storage system consists of a rotating disk coated with a thin metal or some other material that is highly reflective. Optical disks are also known as laser disks or optical laser disks because they use laser beam technology for data read/write.

Q. 2 (c) **The Names and Functions of Registers:**

There are some registers common to all computers. Functions of these registers are described below:

1. **Memory Address Register (MAR).** It holds the address of the active memory location. It is loaded from program control register when an instruction is read from memory.
2. **Memory Buffer Register (MBR).** It holds the contents of the accessed (read/written) memory word. An instruction word placed in this register is transferred to instruction register.
3. **Program Control Register (PC).** It holds the address of the next instruction to be executed. Normally, the instructions of a program are stored in consecutive memory

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locations, and are executed in sequence unless a branch instruction is encountered.

4. **Accumulator Register (A).** It holds the data to be operated upon, the intermediate results, and the results of processing. It is used during execution of most instructions.
5. **Instruction Register (I).** It holds the current instruction being executed. As soon as the instruction is stored in this register, the operation part and the address part of the instruction are separated.
6. **Input/Output Register (I/O).** It is used to communicate with input/output devices. All input information such as instructions and data are transferred to this register by an input device. Similarly, all output information to be transferred to an output device is found in this register.

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Q. 3 (a) Internal Bus:

Internal Bus is basically the lines of communication of the board, the highway so to speak of the mother-board, its infrastructure. Looking at the board you will be able to recognize the bus by all the gold lines of wires running throughout the board. A 64-bit bus is described as 64 wires or lines in the board. The idea of the internal bus is to transfer information across to all components of motherboard especially the external bus.

In general, keep these points in mind when trying to determine the processing power of a computer:

- i) **Addressing scheme:** The larger the addressing capability, the more main memory the computer can control.
- ii) **Register size:** The larger the general-purpose registers, the more data the CPU can operate on in one machine cycle.
- iii) **Data bus:** The larger the data buses, the more efficiently and quickly data and instructions can be moved among the processing components of the computer.
- iv) **Clock speed:** The faster the clock speed, the more machine cycles are completed per second and the faster the computer can perform processing operations.
- v) **Instruction set:** The more powerful the instruction set, the fewer instructions and processing cycles it takes to perform certain tasks.

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Q. 3 (b) Types of Terminals:

A variety of computer terminals are used to enter data, including the following popular types:

1. Point-of-sale (POS) terminals.
2. Financial transaction terminals
3. Executive workstations.
4. Portable terminals.

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5. Microcomputers used as terminals.
1. **A point-of-sale (POS) terminal** is a smart terminal used very much like a cash register, but it also captures sales and inventory data at the point of sale and sends it to the central computer for processing.
 2. **A financial transaction terminal** is used to store data and to retrieve data from a central computer to perform banking-related activities. The two types of financial transaction terminals we see most often are the smart automated teller machines (ATMs) located outside many banks and the specialized dumb terminals used by bank tellers to retrieve a customer's account balance when he or she withdraws or deposits money in person.
 3. **Executive desktop workstations, or integrated workstations,** are intelligent terminals used by management professionals to assist them in their daily activities. These workstations can be operated by themselves as PCs (personal computers) or in connection with a main computer, and they usually have voice and data communications capabilities, meaning that the terminal includes a phone for regular communication and components for special computerized communication.
 4. **A portable terminal** is a terminal that users can carry with them to hook up to a central computer from remote locations, often via telecommunications facilities. Most portable terminals are connected to the central computer by means of telephone lines.
 5. **Micro Computer:**
Microcomputer terminals can be used on their own for processing, as well as smart or intelligent workstations; the type of software used determines what kind of terminal the microcomputer "becomes". This flexibility is very attractive to many businesses.

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Q. 3 (c) Diskette Storage Capacity:

The byte is the unit of measure used most often to determine the capacity of a storage device used with any type of computer. Eight bits equal 1 byte, or 1 character (byte and character are often used interchangeably.) Storage capacities are usually measured in thousands of bytes. In computer terminology, 1,000 bytes is referred to as 1 kilobyte (KB). (Technically, 1 KB equals 1,024 bytes.) 1,000 KB, or a million bytes, is referred to as 1 megabyte (MB). One billion bytes is called a gigabyte (GB), and a terabyte (TB) is 1 million bytes. The capacity of diskettes varies dramatically. Some disks hold as little as 80 KB characters, and other as much as 1,44 MB, which is the equivalent of about a 500-page textbook.

Bit	A binary digit, 0 or 1
Byte	8 bits, or 1 character
Kilobyte (K)	1,000 (actually 1,024) bytes

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Megabyte (MB)	1,000,000 bytes
Gigabyte (GB)	1,000,000,000 bytes
Terabytes (TB)	1,000,000,000,000 bytes

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SECTION "B" – SOFTWARE**Q. 4 (a) Multitasking:**

Technically speaking, multitasking is same as multiprogramming. Many authors do not distinguish between multiprogramming and multitasking because both refer to the same concept. However, some authors prefer to use the term multiprogramming for multi-user systems (systems that are used simultaneously by many users such as mainframe and server class systems), and multitasking for single-user systems (systems that are used by only one user at a time such as a personal computer or a notebook computer). Note that even in a single-user system, it is not necessary that the system processes only one job at a time. In fact, a user of a single-user system often has multiple tasks being processed by the system.

Hence, for those who like to differentiate between multiprogramming and multitasking, multiprogramming is interleaved execution of multiple jobs (of same or different users) in a multi-user system, while multitasking is interleaved execution of multiple jobs (often referred to as tasks of same user) in a single-user system. Typically, computer systems used for such purposes are uniprocessor systems (having only one CPU).

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Q. 4 (b) Storing and Retrieving the Data:**1. Sequential Storage and Retrieval:**

The sequential storage and retrieval method is ideal for situations in which most of the records in a file need to be accessed for processing such as producing payroll (because everyone gets a cheque) or preparing a comprehensive inventory report by part number. In this approach, data is retrieved in the sequence in which it was recorded on the storage media. The records must be accessed (retrieved) one after the other; the user cannot jump around among records. Sequential storage is off-line, it is not accessible to the CPU until it has been loaded onto an input device.

2. Direct Access Storage and Retrieval:

The direct access storage and retrieval method, also called random access, is best suited to situations in which only a few records in a file need to be accessed, and in no particular sequence. Airline reservations systems rely heavily on this method, which uses on-line input/output devices.

3. Indexed Sequential Storage and Retrieval:

In a payroll system, all records are usually accessed in order of employee number, that is, sequentially, when payroll cheques are produced. To be able to access stored data in either a sequential or a direct fashion, a third storage and retrieval methodology was developed – indexed sequential access method (ISAM). This

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method is used almost exclusively with direct access microcomputer storage devices to provide maximum flexibility for processing and has proved to be the most flexible for business applications.

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Q. 4 (c) Analogy Between a Computer Language and a Natural Language:

! There are some popular high-level languages, while there are others that could not become so popular in spite of being very powerful. There might be many reasons for the success of a language but one obvious reason is its characteristics. Several characteristics believed to be important for making a programming language good are:

- ! 1. **Simplicity.** A good programming language must be simple and easy to learn and use. It should provide a programmer with a clear, simple, and unified set of concepts that can be grasped easily.
- ! 2. **Naturalness.** A good language should be natural for the application area for which it is designed. That is, it should provide appropriate operators, data structures, control structures, and a natural syntax to facilitate programmers to code their problems easily and efficiently.
- ! 3. **Abstraction.** Abstraction means the ability to define and then use complicated structures or operations in ways that allow many of the details to be ignored. The degree of abstraction allowed by a programming language directly affects its ease of programming.
- ! 4. **Efficiency.** Programs written in a good programming language are translated into machine code efficiently, are executed efficiently, and acquire relatively less space in memory.
- ! 5. **Structured Programming Support.** A good programming language should have necessary features to allow programmers to write their programs based on the concepts of structured programming. This property greatly affects the ease with which a program may be written, tested, and maintained.
- ! 6. **Compactness.** In a good programming language, programmers should be able to express the intended operations concisely without losing readability. Programmers generally do not like a verbose language because they need to write too much.
- ! 7. **Locality.** A good programming language should be such that while writing a program, a programmer need not jump around visually as the text of the program is prepared. This allows the programmer to concentrate almost solely on the part of the program around the statement currently being worked with.
- ! 8. **Extensibility.** A good programming language should also allow extension through simple, natural, and elegant mechanisms.
- ! 9. **Suitability to its Environment.** Depending upon the type of application for which a programming language has been designed, the language must also be made suitable to its environment.

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Q. 5 (a) File Management System and Database Management System:

Information, no doubt, is a key word in modern management. Anyone with a cluttered office knows, having a large quantity of information on hand does not guarantee ready access to any particular piece of information. Often the basic underlying data to satisfy these information needs are contained in computer files but cannot be accessed and output in a suitable format on a timely basis. For effective decision-making, one should have access to information whenever needed, and what is more, it should be up-to-date and cost-effective.

Data base management systems have the potential to meet this challenge. A Data Base Management System is an effective data management tool, provides invaluable help in coping with data organization and access problems, and improves the quality of information available to the management for decision-making.

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Q. 5 (b) Define following terms:**System Software:**

System software is a set of one or more programs designed to control the operation and extend the processing capability of a computer system. In general, a computer's system software performs one or more of the following functions:

1. Supports development of other application software.
2. Supports execution of other application software.
3. Monitors effective use of various hardware resources such as CPU, memory, peripherals, etc.
4. Communicates with and controls operation of peripheral devices such as printer, disk, tape, etc.

Application Software:

Application software is a set of one or more programs designed to solve a specific problem, or do a specific task. For example, payroll processing software, examination results processing software, railway/airline reservation software, computer games software are all application software. Similarly, a program written by a scientist to solve a research problem is also application software. The programs included in an application software package are called application programs. The programmers who prepare application software are referred to as application programmers.

Some commonly known application software are:

1. Word-Processing Software.
2. Spreadsheet Software.
3. Database Software.
4. Graphics Software.
5. Personal Assistant Software.
6. Education Software

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7. Entertainment Software.

Software Development Steps:

All software needs to be developed by someone. Developing software and putting it to use is a complex process involving following steps:

1. Analyzing the problem at hand, and planning the program(s) to solve the problem.
2. Coding the program(s).
3. Testing, debugging, and documenting the program(s).
4. Implementing the program(s).
5. Evaluating and maintaining the program(s).

Advantages of High-Level Languages:

High-level languages enjoy following advantages over assembly and machine languages:

1. **Machine independence.** A program written in a high-level language can be executed on many different types of computers with very little or practically no effort of porting it on different computers.
2. **Easier to learn and use.** High-level languages are easier to learn because they are very similar to the natural languages used by us in our day-to-day life.
3. **Fewer errors.** While programming in a high-level language, a programmer need not worry, about how and where to store the instructions and data of the program, and need not write machine-level instructions for the steps to be carried out by the computer.
4. **Lower program preparation cost.** Writing programs in high-level languages requires less time and efforts, ultimately leading to lower program preparation cost.
5. **Better documentation.** Statements of a program written in a high-level language are very similar to natural language statements used by us in our day-to-day life. Hence, a programmer familiar with the problem domain can easily understand them.
6. **Easier to maintain.** Programs written in high-level languages are easier to maintain than assembly/machine language programs. This is because they are easier to understand, and hence, it is easier to locate, correct, and modify instructions whenever desired.

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SECTION III C – NETWORK & SECURITY**Q. 6 (a) The Importance of Networking:**

A computer network is a collection of computers and peripheral devices (the network components) connected by communication links that allow the network components to work together. The network components may be located at many remote locations or within the same office.

Networking serves five important purposes:

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1. It allows departments to share hardware. Companies often want peripheral devices that are affordable only if they are shared by several computers.
2. It allows information to be shared. Some files may be used constantly throughout a company. A network gives each office access to the files and programs in the central computer.
3. It allows for the electronic transfer of text. Organizations often transfer textual data from one place to another. Through a network, an electronic mail system may be used to distribute copies of memos or reports.
4. It allows for decentralization of various data processing functions. As microcomputer use spreads throughout an organization, some data processing and analysis functions that had been performed by the data processing department become decentralized and are performed locally within other departments.
5. It allows for communication between organizations.

Private Networks:

Some networks are designed specifically for an organization and used completely by individual organizations. They are called private networks.

Value Added Networks:

Another type of network is the value-added network. This is an established data communication network that owns or leases communication facilities and computers to manage communication. The facilities may include microwave antennas and communication satellites. The owners design and maintain the value-added network.

Integrated Services Digital Network (ISDN):

Carriers can also provide communication services using the ISDN, a digital network that uses the commercial telephone system to provide users with a wide array of telecommunication services.

ISDN is viewed as a critical technology that will change the way we store, process, and receive information. Its growth has accelerated greatly in the last few years and it is likely to become the international standard for data and voice communications.

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Q. 6 (b) Write Short Notes of the following:**Network Interface Unit:**

The network interface unit is a microprocessor based device containing hardware and software which supply the intelligence to control access to and communications across the network and to perform all communications processing. It is the means by which the workstations are connected functionally and physically to the network.

Electronic Data Interchange (EDI):

EDI is the electronic exchange of structured business information, in standard formats, between computers. EDI eliminates the need for a paper-based system by providing an electronic link between companies. EDI is the electronic transfer of structured business

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documents in an organization – internally among groups of departments or externally with its suppliers, customers and subsidiaries.

Examples of current uses of EDI include automatic teller machines (ATMs) in banks where EDI is used for transferring and withdrawing funds between different bank accounts, airline reservation system, stock exchange transactions and car reservation systems.

TCP/IP Communication Architecture:

When it comes to breaking down communication barriers between different computer suppliers, information systems managers in commercial companies now see TCP/IP as a fully functional, proven and low-cost alternative to open systems interconnection.

TCP/IP is used as shorthand for a large set of standards with many different features and functions. The letters "TCP/IP" stand for two communications protocols. Transmission Control Protocol (TCP) and Internet Protocol (IP).

Q. 6 (c) Define briefly the following terms with respect to the Internet.**i) HyperText Markup Language (HTML):**

A powerful language used for creating hypertext documents.

ii) Web Server:

Any computer on the Internet that uses HTTP protocol.

iii) Web Client:

Any computer on the Internet that can access web servers.

iv) Web Browser:

To be used as a web client, a computer needs to be loaded with a special software tool known as WWW browser (or browser in short). Browsers normally provide navigation facilities to help users save time while Internet surfing.

v) Uniform Resource Locator (URL):

An addressing scheme used by WWW browsers to locate sites on the Internet.

vi) HyperText Transport Protocol (HTTP):

An Internet Protocol for interaction among computers on the internet.

THE END!