CA-IPCC/PCC

INFORMATION TECHNOLOGY

IMPORTANT QUESTIONS & ANSWERS

CA-IPCC/PCC

IMPORTANT QUESTIONS & ANSWERS ON INFORMATION TECHNOLOGY

1. Define the following terms briefly:

(i) Central Processing Unit
(ii) BIOS
(iii) Intelligent Terminal
(iv) Seek Time
(v) Subroutine
(vi) File Pointers
(vii) Light pen
(viii) Ethernet
(ix) Output Devices
(x) PROM
(xi) Dumb Terminals
(xii) Rotational Time
(xiii) Buffering
(xiv) Query Language
(xv) Half Duplex (xvi) Protocols

ANSWER

(i) ***Central Processing Unit***: It is the heart of the computer that makes comparisons, performs calculations, reads, interprets and controls the execution of the instructions.

(ii) ***BIOS***: It stands for Basic Input Output System. It is a small chip on the mother board that loads the hardware settings required to load various devices like key boards, monitors, or disk drives.

(iii) ***Intelligent Terminal***: It is a terminal which has an in-built processing capability. It is user programmable and contains not only a storage area but also a micro-processor.

(iv) ***Seek Time***: This is a time required to position a movable read-write head over the recording track to be used.

(v) ***Subroutine***: It is a subset of instructions that appears over and again in the program or finds applications in several programs.

(vi) ***File Pointers***: They establish linkage between records and are a basic part of the file organization of all the database models except the relational model.

(vii) ***Light Pen***: It is a pointing device which can be used to select an option by simply pointing at it, or drawing figures directly on the screen.

(viii) ***Ethernet***: It is a very common network protocol. It uses the linear-bus topology and is inexpensive and simple.

(ix) ***Output Devices***: They are instruments of communication between people and machines. They are used to record the results obtained by the computer and present them to the outside world.

(x) ***PROM***: It stands for Programmable Read Only Memory. It is a non-volatile memory which allows the user to program the chip with a PROM write.

(xi) ***Dumb Terminals***: They are the terminals which cannot do processing on their own and serve only as input / output mechanisms that link users with the central CPU in a large system computing.

(xii) ***Rotational Time***: This is the rotational delay also termed latency, to move the storage medium underneath the read-write head.

(xiii) ***Buffering***: It enables the processor to execute another introduction while input or output is taking place rather than being idle while transfer is being completed.

(xiv) ***Query Language***: It is a set of commands for creating, updating and accessing data from a database. It allows programmers, managers and other users to ask adhoc questions of the database interactively without the aid of programmers.

(xv) ***Half Duplex***: It is a transmission mode under which data can be transmitted back and forth between two stations, but data can only go in one of the two directions at any given point.

(xvi) ***Protocols***: They are software that performs a variety of actions necessary for data transmission between computers. They are a set of rules for inter-computers. They are a set of rules for inter-computer communication that have been agreed upon and implemented by many vendors, users and standard bodies.

2. Give one or two uses or reasons for each of the following:

(i) Use of Diagnostic programs
(ii) Use of interactive processing
(iii) Preference of Network model over hierarchical model
(iv) Bootstrap loader program
(v) Need for Master file
(vi) Use of Cache Memory
(vii) Use of Parallel port
(viii) Preference of relational database model with comparison to hierarchical database model.
(ix) Use of File pointer
(x) Need for repeaters

ANSWER

(i) ***Use of Diagnostic programs***: These are referred as debugging routines or aids. A diagnostic routine is a program that is invoked to provide information or assistance to a programmer on those occasions when his program fails to operate correctly.

(ii) ***Use of interactive processing***:

- Here there is a continuous interaction between user and the machine, therefore it is possible to provide the intermediate results to the user.
- The cost of this system is higher, as interactive devices need to be provided.

(iii) ***Preference of Network model over hierarchical model***:

- Network model permits many to one and many to many which is not supported by hierarchical model
- Network model is relatively flexible than hierarchical model.

(iv) ***Bootstrap loader program***:

- These are programs stored in ROM to bring the operating system from secondary storage to primary storage when the computer is switched on.
- This makes the computer system operational and provides responses to user commands.

(v) ***Need for Master file:***

- Relatively permanent.
- Master files of past become historical files.
- Historical Files are used for comparison purposes e.g., sales analysis.
- Master file is updated using transaction file. Examples: Payroll Master file, Inventory Master file, Student Master file, etc.

(vi) ***Use of Cache Memory***: The Cache memory acts as a temporary memory and boosts processing power significantly. The cache that comes with the processor is called level one (L1) cache. This cache runs at the processor's clock speeds, and therefore, is very fast. The L1 cache is divided into two sections one for data, and other for instructions.

(vii) ***Use of Parallel Port***: Parallel ports are used to connect external input/output devices like scanners or printers. Parallel ports facilitate the parallel transmission of data, usually one byte at a time. Parallel ports use 25 pin Rs. 232C.

(viii) ***Preference of relational database model with comparison to hierarchical database model*** : A relational database is structured into a series of two dimensional tables. It allows flexibility in conducting database queries and creating reports. The link between data elements need not to be made explicit at the time the database is created. It is more flexible and provides managers with rich opportunity for ad-hoc reports and queries. In case of hierarchical database, hierarchy of records must be determined and implemented before a search can be conducted.

(ix) ***Use of File pointers***: File pointers establish linkage between records and are a basic part of the file organization of all the database models except the relational model. A pointer is the address of another related record that is "pointed to". The pointer directs the computer to that related record. It is placed in the last field of a record, if more than one pointer is used, then in the last fields.

(x) ***Need for a repeater in a network***: Repeaters are used to amplify the signal between the sending and receiving stations. Their purpose is to keep the intensity of the signal at the required level. When signal travels long distance, its strength becomes feeble due to cross talk and other electromagnetic interferences. Hence repeaters are used to maintain the intensity at the original level.

3. Define the following terms:

(i) Integrated Test Facility [ITF]
(ii) Clip gallery
(iii) Hacking
(iv) Slides in PowerPoint
(v) Program Flowchart
(vi) Charts in spreadsheet
(vii) TALLY
(viii) Decision Table

ANSWER

(i) ***Integrated Test Facility [ITF]:*** It is a particular form of test data involving the establishment of a "dummy" entity through which data may be processed. For example, a fictitious trading branch might be set up.

(ii) ***Clip Gallery***: The collection of multimedia effects such as sound and videos in WORD 2000 is known as clip gallery. It is very user-friendly.

(iii) *Hacking*: Also known as cracking because the person cracks the log-in codes and sequences of a system. It is the unauthorized entry by a person into a computer system or network.

(iv) ***Slides in Powerpoint***: Every Powerpoint presentation involves the creation of a series of slides. These slides can have text or objects displayed on them. They help in working with presentations more conveniently.

(v) ***Program Flow chart***: It is the most detailed flowchart and is concerned with the logical/arithmetic operations on data within the CPU and the flow of data between the CPU on the one hand and the input / output peripherals on the other.

(vi) ***Charts in Spreadsheet***: Charts create a 'picture' in the minds by giving a visual comparison, pattern and analysis of numbers. They make data interesting and attractive to read and interpret.

(vii) ***Tally***: It is a user-friendly accounting software which facilitates various kinds of accounting solutions in a very simplified format.

(viii) ***Decision Table***: It is a table which may accompany a flowchart, defining the possible contingencies that may be considered within the program and the appropriate course of action for each contingency.

4. Write short notes on the following with reference to a spreadsheet package:

(i) Cell contents
(ii) Range of cells
(iii) Relative and absolute cell addresses
(iv) Graphics feature

ANSWER

(i) ***Cell Contents*** : The intersection of a row and a column is called a cell. Different types of data can be entered into a cell. The four commonly used types of cell data are:

- *Label* – A label is any string of alphanumeric text, used either to enter alphanumeric values in cells or to enter descriptive data or titles to make the contents easier to understand.

- *Numeric value* - A numeric value is a number on which the spreadsheet can perform calculations.
- *Formula* – A formula may include numbers, mathematical operators, mathematical functions supported by the spreadsheet, and cell addresses.
- *Date and Time* – It is normally used in a spread sheet to display the actual date and time whenever the spreadsheet is opened for use, or if calculations are to be made based on date or time.

(ii) *Range of cells* : Many spreadsheet operations involve a range of cells instead of a single cell. A range of cells may involve many cells and entering every individual cell for an operation to be performed on them may be cumbersome and time – consuming. Therefore, all spreadsheet packages allow the use of following types of cell ranges:

- *Row Range* – It is used to include a set of adjacent cells in the same row.
- *Column Range* – It is used to include a set of adjacent cells in the same column.
- *Block Range* – It is used to include a set of adjacent cells in a rectangular group of cells.

(iii) *Relative and absolute cell addresses* : When a formula entered in a cell has references to other cells, by default, the references are relative to the cell with the formula in it. The facility of relative cell addressing is of great help in creating spreadsheet quickly by entering the formula once and copying them to other cells. If a formula requires a cell address, which should not change even when the formula is copies to other cells, absolute cell addressing can be used to accomplish this. Depending on the requirement, a cell reference can be made fully or partially absolute as follows:

- Precede both the column letter and the row number of the cell with a dollar sign to make both column and row references absolute.
- Precede only the column letter of the cell with a dollar sign to make only the column reference absolute.
- Precede only the row number of the cell with a dollar sign to make only the row reference absolute.

(iv) *Graphics feature* : Most spreadsheet packages come with presentation graphics feature, which enables to create graphs and charts from numerical data stored in a spreadsheet. The most popular types of graphics and charts supported for graphical representation of numerical data are line graphs, bar charts and pic charts. This feature is very useful in presenting spreadsheet data in easier to understand visual forms because most people find it difficult to interpret a table of numbers.

5. Distinguish between the following:

(i) Virtual memory and Main memory
(ii) Distributed system and Computer network
(iii) Synchronous and Asynchronous data transmission
(iv) Microfilm and Microfiche
(v) Primary storage and Secondary storage
(vi) Sequential file organization and Indexed file organization
(vii) Multiprogramming and Time sharing
(viii) DDL and DML
(ix) Magnetic disc and Magnetic tape
(x) Cathode Ray Tube (CRT) and Flat Panel display devices.
(xi) Client-server model and Peer-to-Peer model of networking architecture.
(xii) Master file and Transaction file.

ANSWER

(i) *Virtual Memory and Main Memory* - Main memory is a part of the computer hardware, which stores programs, and data that are in active use. Storage locations in main memory are addressed directly by CPU's load and store instructions. Access is slower from main memory than from CPU registers because of large capacity and the fact that it is physically separated from the CPU. Virtual memory, on the other hand, is a technique that allows the execution of a process, even though the logical address space requirement of the process is greater than the physical available main memory. The technique works by dividing a program on disk into fixed length pages or into logical,

variable length segments. Virtual memory thus extends primary memory by treating disk storage as a logical extension of the main memory. Virtual memory helps in efficient main memory utilization. The programs can be loaded partially in the main memory, so more programs can be run at the same time. Hence, efficient CPU utilization and better throughput is possible by using the concept of virtual memory. Virtual memory makes the task of programming much easier, because the programmer no longer needs to worry about the amount of physical or main memory available.

(ii) ***Distributed System and Computer Network -*** A computer network is a collection of computers and terminal devices connected together by a communication system. The computers may include large-scale computers, minicomputers, terminals, workstations and miscellaneous devices. Two computers are said to be inter-connected if they are capable of exchanging information. The connection need not be via a copper wire; but lasers, u-waves and earth satellites can also be used. Computer networks increase the reliability of computer resources and facilitate overall system development. They also satisfy the prime objective of resource sharing which includes device sharing, file sharing, program sharing and program segmentation. A distributed system is one in which the computing functions are dispersed among several physical computing elements. Computer systems are arranged in a computer network, with each system connected to one or more other systems. A distributed system is both a technological and organizational concept. Its premise is that information processing can be more effective if computer hardware, data, software and in some cases, personnel are moved physically closer to the people who use these resources. In distributed system, users have greater control over their computing environment. Network may or may not be a distributed system, depending on how it is used.

(iii) ***Synchronous and Asynchronous Data Transmission*** - Under Synchronous Transmission, bits are transmitted at fixed rate. The transmitter and receiver both use the same clock signals for synchronization. Synchronous transmission allows characters to be sent down the line without start-stop bits. It allows data to be send as a multi-word blocks. It uses a group of synchronization bits, which is placed at the beginning and at the end of each block to maintain synchronization. Timing is determined by a modem. It is faster way of data transmission and many data words can be transmitted per second. However, the synchronous device is more expensive as it must be smart enough to differentiate between the actual data and the special synchronous characters. On the other hand, in asynchronous transmission, each data is accompanied by stop (1) and start (0) bits that identify the beginning and ending of the word. When no information is being transmitted i.e. sender device is idle, the communication line is usually high i.e. there is continuous stream of 1. Asynchronous transmission is a reliable transmission system as the extra start and stop bits ensure that the sender and receiver remain in step with one another. It does not require smart device to differentiate between actual data and start/stop bit. However, it is inefficient as the transmission speed is slowed down when there is huge volume of information to be transmitted.

(iv) ***Microfilm and Microfiche*** - A microfilm is a 16 millimeters (mm) or 35 mm roll of film contained in cartridges. Each roll can hold 2,000 to 5,000 pages of information. It can be read sequentially until the desired record is retrieved and stays in a continuous form. A microfiche, on the other hand, is 105-mm film cut in 4 □.6 inch sheet, each sheet capable of reproducing up to 270 page sized images. It allows direct access to data through hunt and storage procedure.

(v) ***Primary Storage and Secondary Storage*** - Primary storage is the basic means of storing data within the CPU itself. It holds source programs, data files and frequently used routines. It also provides a temporary work area for data produced by intermediate calculations and manipulations. Data ready for output are held in primary storage in the format required by the source program. Data from primary storage can be retrieved in millionths of a second and access is random. Secondary Storage also called auxiliary storage is supplementary to the primary storage associated with the CPU. It is used to hold programs and data files not currently in use. It often has much more total storage capacity in relation to the primary storage and is less expensive (per unit of storage). Secondary storage can be sequential access (such as magnetic tape) or direct access (e.g. magnetic disk, floppy disk etc.)

(vi) ***Sequential File Organisation and Indexed Sequential*** Organisation - In sequential file organization, records are written in the same sequence in which they are collected, but they are organized into certain order. Ordering of records within the file is according to a specific data field, which is known as key field. Records appear in sequential file one after another, in key sequence. Sequential files can be read and processed only in the order in which they are recorded. Thus, to process records in sequential files, it is necessary to read the entire file, from

beginning to end, selecting and handling records as they are encountered. Thus, if the particular record required for processing happens to be the two hundred and first record in the file, the preceding two hundred records must be read first. Sequential organization can be used on all storage media but it is dominant method for magnetic tape. On the other hand, Indexed Sequential Organization is a combination of sequential and direct file organization. Though the files are recorded serially, in a logical sequence, indexing or reference techniques are used so that access can be on a random basis as well as sequentially. Thus, any given file can be processed sequentially because of the sequential recording and also the computer has the ability to look up any record in its index and go to that location immediately. Records are updated in place, without the need to create entirely new files during processing. This method of file organization is used for applications that might require both sequential and random access references.

(vii) ***Multiprogramming and Time Sharing*** - Multiprogramming is a processing mode in which several partially completed tasks are processed concurrently. At any given moment, only one task or job is actually being executed, but within a larger time span of several minutes, the computer is processing several jobs or programs, alternating between actually executing, and performing input/ output activities. Several jobs may be in memory but only one is being executed. When one job needs to do input/ output, another can begin (that is resume) execution. Thus two or more independent programs are executed in the same time span by interleaving their execution. The advantage of multiprogramming is that overall performance of the system can be enhanced. The great speed of the central processing unit can be used and delays in waiting for input or output operations (a condition that is called, being input/ output bound) can be avoided. Time Sharing, on the other hand, is a term used to describe a processing system with a number of independent, relatively low speeds, on-line, simultaneously usable stations which are geographically remote from the computer and from each other. Each station provides direct access to the central processor for obtaining instant responses to the questions asked or statements made in an interactive conversational mode. The speed of the system and the use of multi-programming allows the central processor to switch from one using station to another and to do a part of each job in the allocated "time slice" until the work is completed. The response is so fast that the user has the illusion that no one else is using the computer which creates an impression of having a computer for one's sole use.

(viii) ***DDL and DML*** - The data definition language (DDL) is used to define the physical characteristics of each record - the fields within the record, each field's data type and each field's length and logical name. It is also used to specify relationships among the records. The primary functions the DDL serves are to:

- Describe the schema and sub-schemas.
- Describe the fields in each record and record's logical name.
- Describe the data type and name of each field.
- Indicate the keys of the records.
- Provide the data security restrictions.
- Provide means for associating related records or fields.
- Conceptually it is a link between the logical and physical structure of the database.

The data manipulation language (DML), on the other hand, provides the techniques for processing the database such as retrieval, sorting, display and deletion of data or record. The main functions of the DML are following :

- To provide the techniques for data manipulation such as deletion, replacement, retrieval, sorting or inserting of data or records.
- To enable the user and application programs to process data on a symbolic, logical basis rather than on a physical location basis.
- To provide for independence of programming languages. It supports several high level procedural languages such as COBOL and C/C++.
- To allow the user and application programs to be independent of physical data structures and database structure maintenance.
- To provide for the use of record relationships.

(ix) ***Magnetic disc and Magnetic tape*** - Magnetic discs are the most popular direct access medium i.e. a record can be accessed without having to plod through the previous records. Magnetic tape is a secondary storage technology. It can only access data sequentially. It is very economical and widely in use. For details, refer to Chapter 5, Section

5.2 & 5.4. (x) Cathode Ray Tube (CRT) and Flat Panel display devices CRT devices use a large tube-type element. Inside the tube is a gun that lights up the phosphorescent pixels on the screen surface. It is inexpensive, reliable but bulky and provides limited resolution. Flat-Panel devices, on the other hand, use either a liquid crystal display (LCD) or gasplasma technology. Gas-plasma displays provide better resolution but are expensive. Flatpanel displays are light weight and compact.

(xi) ***Client-server model and Peer-to-Peer model of networking architecture*** - Client-server model is a type of computer network in which there are devices (called server) that are specially dedicated to provide various services to other computers (clients) connected to the system. Peer-to-peer architecture has no dedicated servers. All computers are equal, and therefore they are termed as peer.

(xii) ***Master file and Transaction file*** - Master file is the file containing relatively permanent information, which is used as source of reference and is generally updated periodically. Transaction files are created from source documents used for recording events or transactions. These are details files, and the information is used for updating the master files.

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6. Define the following terms briefly:

(i) ASCII
(ii) Address Bus
(iii) Dumb Terminal
(iv) Graph Plotter
(v) WORM Disk
(vi) Buffering
(vii) Operational Database
(viii) Access Time
(ix) Expert System
(x) Asynchronous Transmission
(xi) Packet Switching
(xii) NIC
(xiii) Direct Attached Storage
(xiv) EDI
(xv) Tape and Disk Management System
(xvi) Run Flowchart
(xvii) Limited Entry Decision Table
(xviii) Word Processor
(xix) Audit Software
(xx) Generalized Audit Packages

ANSWER

(i) ASCII: It stands for American Standard Code for Information Interchange. It is used to represent data in main computer memory. It uses the rightmost seven bits of the 8-bit byte to represent numbers, letters and special characters.

(ii) Address Bus: The address bus is a set of wires that connects the CPU and RAM and carries the memory addresses. The number of wires in it determines the maximum number of memory addresses.

(iii) Dumb Terminal: A dumb terminal is an input/output (I/O) device that provides for data entry and information exit when connected to a computer but has no processing capability. Processing is done by central host computer.

(iv) Graph Plotter: A graph plotter is an output device capable of tracing out graphs, designs and maps into paper and even into plastic or metal plates. It is particularly used in application like Computer-Aided Design (CAD).

(v) WORM Disk: It stands for Write Once, Read Many optical laser disk. Once the data have been written to the medium, they only can be read, not updated or changed.

(vi) Buffering: Buffering is a process that enables the processor to execute another instruction while input or output is taking place rather than being idle while transfer is completed.

(vii) Operational Database: Operational databases store detailed data needed to support the operations of the entire organization. They are also called subject area databases (SADB), transaction databases, and production databases.

(viii) Access Time: It refers to the time interval between the instant when a computer or control unit calls for transfer of data to or from a storage device and the instant when its operation is completed. Thus, access time is the sum of the waiting time and transfer time.

(ix) Expert System: An expert system is a computerized information system that allows non-experts to make decisions comparable to those of an expert. Expert systems are used for complex or ill-structured tasks that require experience and specialized knowledge in narrow and specific subject areas.

(x) Asynchronous Transmission: In asynchronous transmission, each data word is accompanied by stop (1) and start (0) bits that identify the beginning and end of the word. When no information is being transmitted, the communication line is usually high, i.e., there is a continuous stream of 1.

(xi) Packet Switching: Packet switching is a transmission technique which maximizes the transmission capacity of networks. This is accomplished by breaking a message into transmission units, called packets and routing them individually through the network depending on the availability of a channel for each packet.

(xii) NIC: Network Interface Card (NIC) provides the connection for network cabling to servers and workstations. The on-board circuitry on the card provides the protocols and commands required to support the card.

(xiii) Direct Attached Storage: Direct Attached Storage (DAS) is a storage device that connects directly to a single server. Network workstations access the server to connect to this storage.

(xiv) EDI: Electronic Data Interchange (EDI) is computer-to-computer communication using a standard data format to exchange business information electronically between independent organizations.

(xv) Tape and Disk Management System: An automated tape management system (TMS) or disk management system (DMS) is a specialized system software that tracks and lists tape/disk resources needed for data center processing.

(xvi) Run Flowchart: Run flowchart is the chart prepared from the system flowchart. It shows the reference of computer operations to be performed. It expands the detail of each compute box on the system flowchart showing input files and outputs relevant to each run and the frequency of each run.

(xvii) Limited Entry Decision Table: In a limited entry decision table, the condition and action statements are complete. The condition and action entries merely define whether or not a condition exists or an action should be taken.

(xviii) Word Processor: A word processor is application software that helps in the production of a document. Very simply put, it is a text editor that allows us to type, edit and save text.

(xix) Audit Software: Audit software consists of computer programs used by the auditor, as part of his auditing procedures, to process data of audit significance from the entity's accounting system.

(xx) Generalized Audit Packages: Generalized Audit Packages are standard packages developed by software companies specifically for the purpose of auditors for auditing data stored on computers. These are standard packages available off the shelf, which can be used by auditors for audit through the computer.

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7. Give one or two uses or reasons of each of the following:

(i) Secondary Storage
(ii) Reference Files
(iii) Cache Memory
(iv) Internet Streaming SIMD Extensions
(v) SIMM/DIMM Slots
(vi) Static RAM
(vii) Network Computing
(viii) Diagnostic Routines
(ix) Neural Networks
(x) Switches
(xi) CAAT
(xii) Virtual Memory

ANSWER

(i) Secondary Storage: Since the primary storage capacity of most computers is limited, secondary storage is used to supplement the primary storage as it has an almost infinite capacity. It is used to hold data and programs not currently in use. It is also cheaper than primary storage.

(ii) Reference Files: Reference files are used to retrieve a record from a file. These files contain keys of records in other files. In order to retrieve a record, the reference file is searched to find out in which file a record can be located.

(iii) Cache Memory: The cache memory acts as temporary memory and boosts processing power of the processor significantly. To retrieve any data, first the cache is searched and then the primary memory is searched. Access from cache memory is even faster than primary memory.

(iv) Internet Streaming SIMD Extensions: These are the seventy new instructions that were added in Pentium III processor. They dramatically enhance the performance of advanced imaging, 3-D, streaming audio, video and speech recognition applications. They significantly enhance Internet experiences, allowing users to browse through realistic online museums and stores and download high-quality video.

(v) SIMM/DIMM Slots: SIMM stands for Single Inline Memory Modules, while DIMM stands for Dual Inline Memory Modules. SIMM/DIMM slots are used to house RAM modules.

(vi) Static RAM: Static RAM retains the stored data as long as the power remains in, hence it doesn't need to be continually refreshed. It is used mainly in cache memory because of its fast speed.

(vii) Network Computing: Network computing allows the users to share information (databases, memos, messages, and work in progress) and resources (printers, fax machines, and links to external data sources).This is a cheaper alternative also as providing duplicates of these resources for each user can be very costly.

(viii) Diagnostic Routines: These programs assist in program debugging. They usually trace the processing of the program being debugged. They are also used to know the details of the processing equipments in the computer. They are often treated as a category of the utility or service programs.

(ix) Neural Networks: Like human brain, neural networks use interconnected processors that perform many operations simultaneously and interact dynamically to learn from data as it is processed. Although they do not handle unexpected event very well, they are very good at recognizing patterns that humans overlook and at uncovering emerging trends.

(x) Switches: Switches are hardware devices used to direct messages across a network. They create temporary point to point links between two nodes on a network and send all data along that link.

(xi) CAAT: Computer Assisted Audit Techniques (CAATs) provide a means to gain access and to analyze data for a predetermined audit objective, and to report the audit findings with evidences. It helps the auditor to obtain evidence directly on the quality of the records produced and maintained in the system.

(xii) Virtual Memory: Virtual memory is a technique that allows the execution of a process, even though the logical address space requirement of the process is greater than the physical main memory. The technique works by dividing a program on disk into fixed-length pages or into logical, variable-length segments. It thus extends primary memory by treating disk storage as a logical extension of RAM.

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8. Distinguish between the following:

(i) Master File and Transaction File
(ii) RAM and ROM
(iii) MICR and OMR
(iv) Chain Printer and Drum Printer
(v) Multiprogramming and Multiprocessing
(vi) DA and DBA
(vii) Simplex Transmission Mode and Full-duplex Transmission Mode
(viii) Embedded Audit Facilities and Program (Parallel) Simulation

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ANSWER

(i) Master File: A master file contains relatively permanent records for identification and summarizing statistical information. Examples are product file, customer file and employee file. The descriptive information in a master file may include such items as product code, descriptions, specifications, etc. Statistical information, in a customer master file, contains amount outstanding, age of outstanding etc.

Transaction File: Transaction files are created from source documents used for recording events or transactions. These are detail files, and the information is used for updating the master files. If the processing is of batch type, the transactions are accumulated for a period and a transaction file is created at the end of the period. The typical source documents, from which transaction files are created, are purchase orders, job-cards, invoices etc.

(ii) RAM: RAM or Random Access Memory is the memory system constructed with metal-oxide semi-conductor storage elements that can be changed. The purpose of RAM is to hold programs and data while they are in use. Access time is independent of the address of the word. It is extremely fast but can also be quite expensive. RAMs

can be further divided according to the way in which the data is stored, into dynamic RAMs and static RAMs. In dynamic RAM, each memory cell quickly loses its charge so it must be refreshed hundreds of times each second to prevent data from being lost. Static RAM is larger, faster and more expensive. It is static because it does not need to be continually refreshed. Because of its speed, it is mainly used in cache memory.

ROM: ROM or Read Only Memory is used for micro programs not available to normal programmers. ROM refers to a storage that cannot be altered by regular program instructions. The information is stored permanently in such memory during manufacture. The information from the memory may be read out but fresh information cannot be written into it. It is commonly used to hold a set of instructions that are needed frequently, for executing small basic operations, which are not otherwise available in the computer circuitry. One such example is ROMBIOS.

ROM is available in following three forms:

- PROM (Programmable ROM) – PROM chip can be programmed once, thereafter, it cannot be altered.
- EPROM (Erasable Programmable ROM) – EPROM chips can be erased and electrically reprogrammed. Erasure is performed by exposing the chip to ultra-violet light.
- EEPROM (Electrically Erasable Programmable ROM) – The data can be erased by applying electrical charges.

(iii) MICR: MICR (Magnetic Ink Character Recognition) employs a system of printed characters which are easily decipherable by human beings as well as a machine reader. A special printing font is used to represent characters. In this font, each character is basically composed of vertical bars. The characters are printed in special ink, which contains a magnetizable material. When a character is subsequently read, it is passed beneath a reading head and big and small gaps in the character send in different types of impulses represented by 1 bit and 0 bit respectively. MICR possesses a very high reading accuracy; hence it is primarily used in banking industry to process cheques.

OMR: OMR (Optical Mark Recognition) method is commonly used for scoring tests. The optical mark reader when on-line to the computer systems can read up to 2000 documents per hour. OMR can also be used for such applications as order writing, payroll, inventory control, insurance, questionnaires, etc. However, designing the documents for OMR is rather a tough task. They should be simple to understand otherwise errors may result more perhaps than would occur in using traditional source documents and key-punching from them.

(iv) Chain Printer: It has a chain that revolves at a constant speed in a horizontal plane. The complete chain has a complement of 48 numbers, alphabets and special symbols cast on 5 times over. It is confronted by a set of as many hammers as the number of print positions. These hammers are magnetically controlled. The continuous stationery and ribbon are interposed between a segment of the chain and the set of hammers. When a required character on the chain faces its print position, the corresponding hammer is actuated.

Drum Printer: It uses a solid cylinder. There are as many bands on it as the number of print positions. Each band has a complement of 48 numerals, alphabets and special characters cast on it. The drum rotates at a constant speed confronted by a set of as many hammers as the number of bands with the inked ribbon and continuous stationery interposed. In one rotation of the drum, there would be appropriate strikes by the set of the hammers. In the first strike, A's are printed in the appropriate print positions, followed by B, C,…, Z, 0, 1,…, 9 and special symbols one by one.

(v) Multiprogramming: Multiprogramming is defined as execution of two or more programs that all reside in primary storage. Since the CPU can execute only one instruction at a time, it cannot simultaneously execute instructions from two or more programs. However, it can execute instructions from one program, then from second program, then from first again, and so on. This type of processing is referred to as concurrent execution. It is very useful as most of the time CPU remains idle waiting for I/O devices to complete their job because I/O devices are very slow. When I/O devices are working for one program, CPU can execute instructions of another program. Thus, multiprogramming is a technique which helps in utilizing the computer system more effectively. It is a module that is available in an operating system.

Multiprocessing: Multiprocessing (or parallel processing) refers to the use of two or more central processing units linked together, to perform coordinated work simultaneously. Instructions are executed simultaneously because the available CPUs can execute different instructions of the same program or of different programs at any given time. Since several machines can work as a team and operate in parallel, jobs can be processed much more rapidly than

on a single machine. Multiprocessing offers data processing capabilities that are not present when only one CPU is used. Many complex operations can be performed at the same time.

(vi) DA: Whether database technology has been successfully developed and implemented in the organization is determined to a great extent by Data Administrators (DA). The role played by the DA is more business oriented than technical. The main functions performed by the DA are:

- The policies regarding database development and control functions must be centralized under the control of the DA.
- The DA should apply resource management principles to maximize the utilization of data as a whole.
- The DA should ensure that the data is available for sharing by the entire organization.
- The DA decides what data will be stored in the database and establishes policies for accessing and maintaining the database.
- The DA is the key person involved in the strategic planning of data resources, which involves determination of the principal business processes the database should support and the identification of the data needed to carry out these processes.

DBA: Data Base Administrator (DBA) is a database professional who actually creates and maintains the database, and also carries out the policies developed by the DA. The role of the DBA is more technical than that of the DA. The main functions performed by the DBA are:

- The DBA is responsible for defining the internal layout of the database and also for ensuring that the internal layout optimizes system performance.
- The DBA discusses the data requirements with the users and then converts these requirements into a physical design that specifies hardware resources required for the purpose.
- The DBA uses Data Manipulation Language (DDL) to define the contents of the database, data formats, relationships among various data elements and their usage.
- Maintaining standards and controlling access to database are two other important functions that are handled by the DBA using DDL.
- The DBA also prepares documentation which includes recording the procedures, standards, guidelines and data descriptions necessary for the efficient and continued use of the database environment.
- The DBA ensures that the operating staff performs its database processing related responsibilities in a proper way.
- The DBA also monitors the database environments. He ensures that the standards for database performance are being met and the accuracy, integrity and security of data are being maintained.
- The DBA is also responsible for incorporating any enhancements into the database environment.

(vii) Simplex Transmission Mode: A simplex communication mode permits data to flow in only one direction, with the full bandwidth of the cable being used for transmitting data. A terminal connected to such a line is either a send-only or a receive-only device. Simplex mode is seldom used because a return path is generally needed to send acknowledgements, control or error signals.

Full-duplex Transmission Mode: A full duplex connection can simultaneously transmit and receive data between two stations, dividing the bandwidth in two parts – one for sending and the other for receiving. It is most commonly used communication mode. A full duplex line is faster, since it avoids the delay that occurs in a half-duplex mode each time the direction of transmission is changed.

(viii) Embedded Audit Facilities: Embedded audit facilities consist of program procedures written by the auditor, which are inserted into the client's application programs and are executed simultaneously with those programs. The main purpose of this technique is to review transactions as they are processed, to select items according to criteria specified in the resident code, and to write details of these items to an output file for subsequent audit examination. This uses one or more specially designed data collection modules which are inserted in the application program at points determined by the auditor, to select and record data. The auditor also determines the criteria for selection and recording. Automated or manual methods may be used to analyze the data later on. This is intended to highlight unusual transactions, which can be taken up for scrutiny. This technique can be used as part of a substantive approach, to test the validity and accuracy of input data processed through a system and, as part of a compliance approach, to confirm the operation of controls within the system.

Program (Parallel) Simulation: The auditor also may adopt this concept through parallel simulation. This consists of a separate computer application that performs the same functions as those used by the installed program. It uses the same data and files and the results must be the same as those produced by the installed program. Conceptually this is the same as auditing around the computer. Parallel simulations may be done in any programming language. Speed of execution is not a criterion, as the parallel simulation will be done only on a one-off basis and not as a regular production run. This application uses computer audit programs designed to perform the same procedures as client programs. The computer audit program is applied to the client data file(s) and the results obtained are compared with the results of processing done by the client's program on the same file. It confirms that the program procedures have operated correctly. It may also verify that the resulting balances are derived correctly from the input data.

9. Distinguish between the following:
(i) Real-time and On-line systems
(ii) Serial and Sequential file organization methods
(iii) Bubble memory and Flash memory
(iv) Analog computers and Digital computers.

ANSWER

(i). ***Real-time systems*** refer to the technique of updating files with transaction data immediately after the event to which it relates occurs. ***On-line systems*** refer to processing of individual transactions as they occur from their point of origin .

(ii) ***Serial organization*** is the simplest file organization method, in which records are arranged one after another, in no particular order-other than the chronological order in which records are added to a file. In ***sequential organization,*** records are arranged one after another, in a predetermined order.

(iii) ***Bubble memory*** is composed of small magnetic domains (bubbles) formed on a thin single – crystal film of synthetic garnet. Data in a bubble memory is retained when power to the memory is turned off, it can be used for auxiliary storage. ***Flash memory*** chips are one of the latest storage devices. They are a form of static RAM(SRAM) chips and store data much like those used in the computer's primary memory. The data in flash memory stays recorded even when the power is turned off. It is nonvolatile.

(iv) ***Analog computes*** process data input in a continuous form. Data such as voltage, resistance or temperature and pressure are represented in the computer as a continuous, unbroken flow of information. ***Digital computers***, on the other hand count and accept letters or numbers through various input devices that convert the data into electric pulses, and performs arithmetic operations on numbers in discrete form.

10. Describe briefly, the following terms with reference to Information Technology:
(i) FAT
(ii) Intelligent terminal
(iii) Overlay
(iv) Packet switching
(v) FTP

ANSWER

(i) ***The data bus*** : The data bus is an electrical path that connects the CPU, memory and other hardware devices on the motherboard. It is a group of parallel wires in which each wire transfers one bit at a time. Data bus can be 8-bits, 16 bits or 32 bits etc long.

(ii) ***Intelligent Terminal*** : It has an in-built processing capability. It is also user programmable. In addition to the storage areas, it has a microprocessor, which can be programmed to communicate with and instruct the user who is entering data.
(iii) ***Overlay*** : It is a technique which makes it possible to execute programs which are too large to fit into the computer's internal storage at one time. The program is segmented and two or more segments occupy the same internal storage location at different times during execution of the program.
(iv) ***Packet Switching*** : It is a sophisticated means of data transmission capacity of networks. In packet switching, all the data coming out of a machine is broken up into chunks. Each chunk has the address of the location it came from and also the address of the destination. This technique is used to move data around on the Internet.
(v) ***FTP*** : FTP refers to File Transfer protocol. It is a common method of moving files between two Internet sites. There are many publicly accessible sites from where information can be obtained using FTP.

11. Give one or two reasons for each of the following:
(i) The presence of parity bit in the Coding system.
(ii) Integrated circuits are used for primary memory and not for secondary storage.
(iii) Use of multiplexer in data communication.
(iv) Disk formatting.
(v) Preference of relational database model with comparison to hierarchical database model.

ANSWER
(i) The parity bit is an additional or redundant bit that is used to provide a check on the integrity of a data representation. It is used as even or odd parity check.
(ii) The integrated circuits, also called silicon chips do lose their contents when the computer's power is shut off. These chips provide volatile storage. Due to this reason they are not used for secondary storage since secondary storage serves as a means of
permanent storage device.
(iii) Multiplexer enables several devices to share one communication line. It scans each device to collect and transmit data on a single line to the CPU.
(iv) A new diskette is nothing more than simple coated disk encased in plastic. Before the computer can use it to store data, it must be magnetically mapped into tracks and sectors called formatting so that the computer can go directly to a specific point on the diskette without searching through data.
(v) A relational database is structured into a series of two dimensional tables. It allows flexibility in conducting database queries and creating reports. The link between data elements need not to be made explicit at the time the database is created. It is more flexible and provides managers with rich opportunity for ad-hoc reports and queries. In case of hierarchical data base, hierarchy of records must be determined and implemented before a search can be conducted.

12. (a) Explain the following commands / functions with reference to spread sheet package:
(i) MOVE
(ii) FV (pmt, int, term)
(iii) CREATE
(iv) @ MIN (range)
(v) @ INT (x)
(b) Write short notes on the following with reference to a spreadsheet package:
(i) Cell contents
(ii) Range of cells
(iii) Relative and absolute cell addresses
(iv) Graphics feature

ANSWER

(a) (i) *MOVE*: This command moves contents of cells and the formulas therein to another part of the worksheet. All cell references in formula of the current worksheet are relocated by the spread-sheet program.

(ii) *FV (pmt, int, term):* This function calculates the Future Value of an annuity payment at the specified rate of interest and term period in a spreadsheet program.

(iii) *CREATE*: It is used to create a database structure in a specified name by defining name of the field, field type and the field size.

(iv) *@ MIN (range):* This statistical function finds out the minimum value in the specified list in a spreadsheet program.

(v) *@ INT (x):* This mathematical function computes the integral part of the value or formulae x in a spreadsheet program. All fractional values are truncated and only the integral part of the value is retained.

(b) (i) ***Cell Contents* :** The intersection of a row and a column is called a cell. Different types of data can be entered into a cell. The four commonly used types of cell data are:

- Label – A label is any string of alphanumeric text, used either to enter alphanumeric values in cells or to enter descriptive data or titles to make the contents easier to understand.
- Numeric value – A numeric value is a number on which the spreadsheet can perform calculations.
- Formula – A formula may include numbers, mathematical operators, mathematical functions supported by the spreadsheet, and cell addresses.
- Date and Time – It is normally used in a spread sheet to display the actual date and time whenever the spreadsheet is opened for use, or if calculations are to be made based on date or time.

(ii) *Range of cells* : Many spreadsheet operations involve a range of cells instead of a single cell. A range of cells may involve many cells and entering every individual cell for an operation to be performed on them may be cumbersome and time – consuming. Therefore, all spreadsheet packages allow the use of following types of cell ranges:

- Row Range – It is used to include a set of adjacent cells in the same row.
- Column Range – It is used to include a set of adjacent cells in the same column.
- Block Range – It is used to include a set of adjacent cells in a rectangular group of cells.

(iii) *Relative and absolute cell addresses* : When a formula entered in a cell has references to other cells, by default, the references are relative to the cell with the formula in it. The facility of relative cell addressing is of great help in creating spreadsheet quickly by entering the formula once and copying them to other cells. If a formula requires a cell address, which should not change even when the formula is copies to other cells, absolute cell addressing can be used to accomplish this. Depending on the requirement, a cell reference can be made fully or partially absolute as follows:

- Precede both the column letter and the row number of the cell with a dollar sign to make both column and row references absolute.
- Precede only the column letter of the cell with a dollar sign to make only the column reference absolute.

- Precede only the row number of the cell with a dollar sign to make only the row reference absolute.

(iv) ***Graphics feature*** : Most spreadsheet packages come with presentation graphics feature, which enables to create graphs and charts from numerical data stored in a spreadsheet. The most popular types of graphics and charts supported for graphical representation of numerical data are line graphs, bar charts and pic charts. This feature is very useful in presenting spreadsheet data in easier to understand visual forms because most people find it difficult to interpret a table of numbers.

13. (a) Write short notes on the following (MS-Excel):
(i) AutoComplete
(ii) Print Area
(iii) Cell
(iv) Macro

(b) Define the following functions used in MS-Excel:
(i) AVERAGE ()
(ii) EXP ()
(iii) IRR ()
(iv) VARP ()
(v) SIGN ()

ANSWER

(a) (i) ***AutoComplete:*** The AutoComplete feature of Excel completes entries that contain text or a combination of text and numbers in a column. Excel displays this feature only if the data column is continuous. If there is a blank cell in the previous row of the column, then AutoComplete does not offer any suggestions. This feature is useful when the same text needs to be entered repeatedly in a column. Instead of keying in the same text over and over again, Excel automatically fills a cell with the text that appears in the cell above it if the first letter in the new entry matches the first letter of the previous one or it gives an option to select from a list of entries already in the column.

(ii) ***Print Area:*** Excel has an option called Print Area in the File menu. After selecting the print range, one can click on Set Print Area accessed from Print Area. The range gets set. Now Excel will print only that much area and not the entire worksheet. To remove the selected print area, choose Clear Print Area. Print area can also be selected by following the below mentioned steps:

1. Select Page Setup from the File menu.
2. On the Sheet tab, enter the cell address range in the Print Area text box. Or select the print area from the worksheet directly by clicking the arrow in the text box, marking the area, and again clicking the arrow.
3. Click OK.

(iii) ***Cell:*** In Excel, a cell is the intersection of a row and a column. Each cell has a unique address. The address of any cell is the combination of its column label and row title. For instance, cell address A1 is created by the intersection of Column A and Row 1. The active cell is distinguished by a dark box called the cell pointer. One can enter data only in the active cell.

(iv) ***Macro:*** Macro is a small program that carries out pre-defined and pre-recorded series of steps by giving a few keyboard shortcuts. We can say that macro is like a recorded movie, which can be run any number of times. Macro is just a way of doing work in a series of steps, which it carries out automatically once it is triggered. A macro automates the tasks, thus saving a lot of precious time. It is limited by the user's imagination.

(b) (i) ***AVERAGE (number1, number2, …):*** It is a statistical function which returns the average (arithmetic mean) of the values in the list of its arguments.

(ii) ***EXP (number):*** It is a mathematical function which returns e raised to the power of a given number.

(iii) ***IRR (values, guess):*** It is a financial function which returns the internal rate of return for a series of cash flows.

(iv) ***VARP (number1, number2, …):*** It is a statistical function which calculates variance based on the entire population (ignores logical values and text in the population).

(v) *SIGN (number):* It is a mathematical function which returns the sign of a number: 1 if the number is positive, zero if the number is zero, or -1 if the number is negative.

14. Define the following terms briefly with reference to a computer system and data processing:

(i) Control Unit	(ii) BUS
(iii) Flash Memory	(iv) Voice recognition
(v) WORM disks	(vi) Image Database
(vii) CAD/CAM	(viii) Uniform Resource Locators (URLs)
(ix) CD ROM Disk	(x) Light pen
(xi) Joystick	(xii) Graph Plotter
(xiii) Computer Network	(xiv) Electronic mail
(xv) Database	(xvi) Data Redundancy

ANSWER

(i) *Control unit:* It supervises the operations of the entire computer. It selects the program statement from the storage unit, interprets statement and sends the appropriate electronic impulses to the arithmetic / logic and storage units for carrying out the operations.

(ii) *BUS:* It is the system's expressway – it transmits data between the various components on the motherboard of a PC.

(iii) *Flash Memory:* Flash memory chips are a form of static RAM chips but they are faster. They are also non-volatile and they may eventually replace the present hard disk drives.

(iv) *Voice Recognition:* It is the capability of translating voice to text. With it, one can speak to the computer rather than having to type. The user can also control the computer with oral commands.

(v) *WORM disks:* It stands for Write Once, Read Many optical laser disks. These are used by end-user companies to store their own proprietary information. It is a feasible alternative to magnetic tape for archival storage.

(vi) *Image Database:* It is a database in which a wide variety of images can be stored electronically. The job of an image database is to store images in such a way that they can be quickly found, easily accessed, and if needed, easily converted to the format needed.

(vii) *CAD/CAM:* They stand for Computer-Aided Design and Computer-Aided Manufacturing. These techniques have made it possible to shorten the time greatly and to improve procedure for developing and building sophisticated new products.

(viii) *Uniform Resource Locators [URLs]:* They are used to address and access individual Web pages and Internet resources. The format of a URL is: protocol/ Internet address/ web page address.

(ix) *CD ROM Disk:* It stands for compact-disk-read-only memory. It is created as a mastering facility. The data on the disk are fixed, and cannot be altered. It gives the presenter instant random access to any sequence of images on the disk.

(x) *Light pen:* It is a pointing device which can be used to select an option by simply pointing at it, or draw figures directly on the screen and move the figures around.

(xi) *Joystick:* It is a screen pointing input device. It is a vertical level usually placed in a ball socket, which can be fitted in any direction to control cursor movements for computer games and for some professional applications.

(xii) *Graph plotter:* It is a device capable of tracing out graphs, designs and maps into paper and even into plastic or metal plates.

(xiii) *Computer Network:* It is a collection of computers and terminal devices connected together by a communication system.

(xiv) *Electronic Mail:* Through E-mail messages can be sent from one person to another via computer. It can also be sent automatically to a large number of addresses.

(xv) ***Database:*** It is an integrated file of data used by many processing applications. It consists of data items that must be stored in order to meet the information processing and retrieval needs of an organisation.
(xvi) ***Data Redundancy:*** It concerns the problems of inefficient data storage and wastage of storage space. This means, data that should be stored in only one storage location occupies two or more storage locations.

15. Define the following terms with reference to computer system and data processing:
(i) Digitize (ii) Distributed Data Processing (iii) Check Digit
(iv) Spooling (v) Multiplexer (vi) Job Scheduler
(vii) File server (viii) Tele-conferencing

ANSWER
(i) ***Digitize:*** It is a computer processing method which is used in CAD/CAM. Under this method, computers are programmed to assign digital values to graphic information and to process and store these values.
(ii) ***Distributed Data Processing:*** It is the converse of the centralized data processing and uses the philosophy of providing computer power where it is needed. There may be a large, central computer with a series of small computers, even mini computers or micro computers or there may simply be a number of computers of equal size scattered geographically. Each remote system is a fully independent computer that maintains its own local database in addition to communication with the host computer. These individual computers are tied together through a high-speed data communication network.
(iii) ***Check digit:*** It is a digit associated with a word or part of word for the purpose of checking the existence of certain class of errors. It is a software control used by a programmer to ensure accuracy of the data fed in the computer. The check digit then becomes a part of the code, and the same arithmetic procedure is used to check the correctness of the code in all subsequent processing operations. Modulo 11 is the most foolproof check digit.
(iv) ***Spooling (simultaneous peripheral operation on-line)*** is a technique used for dynamic job processing. It allows input and output operations to occur simultaneously with processing operations. Input data from low-speed devices is stored temporarily on high speed secondary storage units to form a queue which can be quickly accessed by the CPU. Output data is also written at high speed onto tape or disk units and forms another queue waiting to use slow-speed devices such as a printer . The jobs are transferred to these output devices when these units are available. The operating system supplies a special written program to control the spooling process. Hence, with the aid of spooling technique, the CPU does not have to wait for the slow input/output devices and hence it can work at its maximum speed.
(v) ***Multiplexer:*** It is a device that enables several devices to share communication line. The multiplexer scans each device to collect and transmit data on a single line to the CPU. It also communicates transmission from the CPU to the appropriate terminal linked to the multiplexer. The devices are poled and periodically asked whether there is any data to transmit
(vi) ***Job Scheduler:*** It refers to a person within a computer installation who monitors computer work loads and makes sure that all resources and material necessary for running jobs are available to people who need them.
(vii) ***File Server:*** A file server is a dedicated microcomputer with high capacity disks for storing data and programs shared by the local area network users. For example, the master client file, word processing software, spreadsheet software and so on would be stored on the server disk. When a user wants to use a spreadsheet software, it is to be loaded from the file server to the user's RAM.
(viii) ***TeleConferencing***: It refers to the inter connection of a number of end users through a telephone and / or data network, so that information can be shared in real time. Tele conferencing enables people in different locations to see and talk to each other and share charts and other visual meeting materials. The telephone network supports the voice and video of teleconferencing. People who are geographically scattered can meet without the need for time consuming and expensive travel.

16. State whether the statements given below are true or false. Give reason to support your answer in two to three lines:

(a) A single primary storage location in the processor unit is identified by a number that varies with the contents in the location.

(b) The storage capacity of each numbered address in the processor unit is always able to hold a word consisting of four characters.

(c) ASCII is a 8-bit BCD code used in IBM main-frames.

(d) Distributed data entry is a term used to describe placement of data entry function at the scattered locations where the transactions occur.

(e) The most popular input device used today for interactive processing and for on-line entry of data for batch processing is the mouse.

(f) User programmable terminals that combine VDT (Visual Display Terminal) hardware with built-in microprocessor is called a dumb terminal.

(g) The number of characters that can be stored in a given physical space is referred to as data density.

(h) The screen pointing device which rolls on a small bearing and has one or more buttons on the top is called a light pen.

(i) The seek time of the storage element is the time it takes to locate and retrieve stored data in response to program instruction.

(j) Data stored on disk can be accessed only in sequential way.

(k) The use of spooling program and / or buffer hardware allows personal computer operators to do other processing work at the same time a printing operation is in progress.

(l) High speed impact line printers typically use rapidly moving chains or bands of print characters or some form of a print drum to print lines of information on paper.

ANSWER

(a) False: A single primary storage location in the processor unit is identified by a built in an unique number called an address.

(b) False: Since the storage capacity of each numbered address in the processor unit depends on the storage design approach built into the processor. For example, it can be 16 bits, 32 bits or 64 bit etc.

(c) False: Since ASCII is a 7 bit code used by personal and mini computers.

(d) True

(e) False: The most popular input device used for interactive processing and the on-line entry of data for batch processing now a days is a visual display terminal.

(f) False: The dumb terminal has not built-in microprocessor but an intelligent terminal is user programmable with a built-in microprocessor.

(g) True

(h) False: Such a device is called a mouse.

(i) False: Since the time it takes to locate and retrieve stored data in response to the program instruction is called the access time.

(j) False: Since the data stored in the disk can be accessed in a direct as well as sequential way.

(k) True

(l) True

17. Write short notes on the following:

(a) Client server technology	(b) Desk top publishing	(c) EDI
(d) Multimedia	(e) B2B	(f) Public key
(g) Private key	(h) Digital certificate	(i) Wallet

ANSWER

(a) *Client server technology:* Describing a network as a LAN or WAN gives a sense of the physical area the network covers. The way in which individual computers (called nodes) on a network interact with other computers on the network depends on how they are organised. One approach for organising networks is called client-server strategy in which one particular computer serves the storage needs and sometimes the processing needs of all the network nodes. The most common types of client server arrangement is a LAN composed of microcomputers connected to a network server which serves to all the clients (users) of the LAN. A client program running on one of the microcomputers can request specific data from the server. The server program retrieves the requested data from its databases and returns it to the client. This way a LAN permits all the computers connected to it to share hardware, software and data. The most commonly shared resources are disk-storage devices and printers. A file server is a principal computer with large disk storage on a network that stores files and provides network nodes with access to these files. When a program running on a node needs data in a database, the file server grants access to the database files to the program running on the node. Any sort of querying of the database is done by the program on the node.

(b) *Desk Top Publishing*: The use of desk-top publishing systems is growing rapidly in businesses these days. Desktop publishing systems combine computers and suitable peripherals with software that can produce attractive page layouts complete with pictures and text printed in a variety of type faces or fonts. With latest developments, even general purpose PC can be used to run off-the-shelf desktop publishing packages. These packages give Pcs many of the general capabilities found in the aforesaid dedicated publishing systems. However, both types of systems accept digitized text and picture input, both accept data imported from word processors, page formatting and graphics files; both allow users to create, edit, format and enter text and graphics into documents. A clip-art library file or ready-to-use picture is included in many publishing packages. After final decision on text, pictures, headings, borders and other document features have been reached, the output of a publishing package can be sent to a laser or other graphics printers or to phototype-setting or other output machines that can communicate with the package. Often a page description language is used to permit communication between the package and output device.

(c) *EDI or Electronic Data Interchange* uses computers and data communication equipments to transmit data electronically between companies. Invoices, sales orders, and many other transaction documents can be transmitted from one computer to another thereby enhancing electronic exchange of information. EDI is helping many businesses to cut the costs associated with shipping, receiving, and maintaining parts and supplies. It is a set of standards that define the way paper forms should be rendered electronically. Software on each company's computers translates the items into standard codes. Electronic documents exchanged in EDI format also include such standard information as the balance due, the quantity ordered, the date on which items are needed and similar elements. Together, they create a data stream to the computer. Since no paper is ever used, the data flows straight from one computer into another, saving the tedious process of creating forms and then entering them into another computer. The merits of EDI are as indicated below:

- reduction of paper processing cost
- reduction of errors and correction costs
- reduction of delays
- minimization of receivables and inventory conflicts
- improved relations between trading partners.

(d) *Multimedia*: To make powerful presentation of information using various audio and visual means has been a dream come true with the help of this technology. Using computers and various peripheral devices like graphic devices, video cameras, Video players, CD players, voice or music record & playback systems, the text and graphics can be combined and presented in audio and video ways. One multimedia presentation could, for example, include full motion video, freeze frames from a video source such as a video camera or video disk player, voice, music or other sounds, text and graphics which can be animated. Animation or continuous movement graphics, can be as simple as a bar chart that grows before the viewer's eyes or a complicated walkthrough of how cold drink is made. The hardware and software collected to create multimedia presentations often includes:

- A Pentium processor based or better microcomputer
- A colour monitor
- An erasable disk drive
- A multimedia controller board for digital sound, graphics, and motion video an authoring system, such as IBM's Audio Visual Connection (AVC) which is software for creating multimedia presentation

A multitasking operating system, such as Windows The list reflects only the minimum requirements. The disparate components of multimedia come from many sources and getting them into one computer requires a correspondingly wide variety of equipments. Initial implementations of multimedia have been for training, education, and business meeting purposes, as well as monitoring and controlling operations. Most industry observers expect the potential of multimedia to be much more farreaching.

(e) *B2B (business-to-business)* :On the Internet, B2B (business-to-business), also known as e-biz, is the exchange of products, services, or information between businesses rather than between businesses and consumers. Although early interest centered on the growth of retailing on the Internet (sometimes called e-tailing), forecasts are that B2B revenue will far exceed business-to-consumers (B2C) revenue in the near future. According to studies published in early 2000, the money volume of B2B exceeds that of e-tailing by 10 to 1. Over the next five years, B2B is expected to have a compound annual growth of 41%. The Gartner Group estimates B2B revenue worldwide to be $7.29 trillion dollars by 2004. In early 2000, the volume of investment in B2B by venture capitalists was reported to be accelerating sharply although profitable B2B sites were not yet easy to find. B2B Web sites can be sorted into following categories::

Company Web sites, since the target audience for many company Web sites is other companies and their employees. Company sites can be thought of as round-the-clock mini trade exhibits. Sometimes a company Web site serves as the entrance to an exclusive extranet available only to customers or registered site users. Some company Web sites sell directly from the site, effectively e-tailing to other businesses.

Product supply and procurement exchanges, where a company purchasing agent can shop for supplies from vendors, request proposals, and, in some cases, bid to make a purchase at a desired price. Sometimes referred to as e-procurement sites, some serve a range of industries and others focus on a niche market.

Specialized or vertical industry portals which provide a "sub Web" of information, product listings, discussion groups, and other features. These vertical portal sites have a broader purpose than the procurement sites (although they may also support buying and selling).

Brokering sites that act as an intermediary between someone wanting a product or service and potential providers. Equipment leasing is an example.

Information sites (sometimes known as infomediary), which provide information about a particular industry for its companies and their employees. These include specialized search sites and trade and industry standards organization sites. Many B2B sites may seem to fall into more than one of these groups. Models for B2B sites are still evolving. In short, B2B is e-commerce between businesses. An earlier and much more limited kind of online B2B prior to the Internet was Electronic Data Interchange.

(f) *Public key*: A public key is a value provided by some designated authority as a key that, combined with a private key derived from the public key, can be used effectively for encryption of messages and digital signature. The use of combined public and private keys is known as *asymmetric* cryptography. A system for using public keys is called a public key infrastructure.

(g) *Private key*: In cryptography, a private or secret key is an encryption/decryption key known only to the party or parties that exchange secret messages. In traditional secret key cryptography, a key would be shared by the

communicators so that each could encryption and decrypt messages. The risk in this system is that if either party loses the key or it is stolen, the system is broken. A more recent alternative is to use a combination of public and private keys. In this system, a public key is used together with a private key.

(h) *Digital certificate*: A digital certificate is an electronic "credit card" that establishes your credentials when doing business or other transactions on the Web. It is issued by a certification authority (CA). It contains your name, a serial number, expiration dates, a copy of the certificate holder's public key (used for encryption of messages and digital signature), and the digital signature of the certificate-issuing authority so that a recipient can verify that the certificate is real. Some digital certificates conform to a standard, X.509. Digital certificates can be kept in registries so that authenticate user can look up other users' public keys.

(i) *Wallet* : A wallet is a small software program and data that is used for online purchase transactions. Currently, CyberCash allows the consumer to get free Wallet software that allows several methods of payment to be defined within the wallet (for example, several different credit cards). Here's how it works:

When you order something, the order is sent to the merchant. The merchant (actually, the merchant's server) sends back an invoice and asks the consumer to launch the Wallet in his computer (or to download it quickly if the consumer doesn't have it yet). When the consumer selects "Pay," the Cyber Cash software on the merchant server sends a message back to the consumer's PC that activates the "Wallet" software. The consumer selects one of the cards defined in the Wallet and clicks. The transaction includes real-time credit card authorization.

18. Distinguish between the following:
    (a) Third generation and fourth generation of computers.
    (b) Sequential file organisation and random file organisation.
    (c) On line system and real time system.
    (d) Impact printers and nonimpact printers
    (e) Flowchart and Decision table
    (f) Local area and Wide area network

ANSWER

(a) *Third generation and fourth generation of computers*: Third generation computers are based on integrated circuit technology and are much faster, compact and consume less power than previous generation computers. Fourth generation computer systems are characterized by further miniaturisation and refinement of the semi-conductor technology. Computers of this generation use large scale integration (LSI) and very large scale integrated (VLSI) circuits. Micro computer systems were developed using this technology. Third generation computers offered many salient features such as better operating systems, multiprogramming and support of secondary storage tapes and disks. Extensive use of higher level languages and introduction of the data base software are other important features of these computers.

On the other hand, fourth generation computers are characterised by the use of micro electronic technology which allowed computer manufacturers to place into hardware what was formerly in the form of software. User oriented software, concept of virtual storage which expands main storage capacity to millions of characters, introduction of office information systems, word processing and electronic mail etc are other significant developments in fourth generation computers. These systems have several other features like compatibility, standardisation, networking and communication facilities, introduction of fourth generation languages and generalised application software for personal computers. Unlike third generation computers which were confined to only very large companies, fourth generation computers are accessible by small organisations and even individuals due to their compact size and low cost.

(b) *Sequential file organisation and random file organisation*: In sequential file organisation, records are written in the same sequence in which they are collected, but they are organized into certain order. Ordering of records within the file is according to a specific data field, which is known as key field. Records appear in sequential file one after another, in key sequence. Sequential files can be read and processed only in the order in which they are

recorded. Thus, to process records in sequential files, it is necessary to read the entire file, from beginning to end, selecting and handling records as they are encountered. Thus, if the particular record required for processing happens to be the two hundred and first record in the file, the preceding two hundred records must be read first. Sequential orgnaisation can be used on all storage media but it is a dominant method for magnetic tape.
Random file organisation, on the other hand, is used with direct access storage devices such as magnetic disk. Records can be written or accessed at random. The transactions can be processed in any order and written at many locations throughout the stored file. To access a record, prior records need not be examined first. The CPU can go directly to the desired record without searching all the other in the file. In other words, this scheme permits immediate access to records for inquiring and updating purposes.

(c) *Online system and real time system*: The terms online processing and real time processing are used interchangeably but there is a basic difference between the two. Online processing refers to processing of individual transactions as they occur from their point of origin. This processing mode utilizes direct access devices such as magnetic disk and number of terminals connected to and controlled by a central processor. It provides multi access to information files by terminal users and also enables them to update files with transaction data. Aside from transaction processing and file updating, inquiries are also handled by the online processing system. It also ensures that the records are in updated status at any time.

The term real time processing, on the other hand, refers to the technique of updating files with transaction data immediately after the event to which it relates occurs. Real time processing is basically on line processing with one specialty in inquiry processing. Online updating in real time usually leads to transactions as a by product. The response of the system for the inquiry itself is used to control the activity. It would normally differ from one activity to another. The response of a real time system is one type of feedback control system. An online production data collection system that simply accepts input and utilizes it for payroll and costing purposes cannot be termed real time, but if, on the other hand, the system is designed to provide immediate information to monitor the production process, it is real time processing.

(d) *Impact Printers and Non-impact Printers*: Impact printers operate with revolving print chains, rotatory printwheels or wire matrix printers. Non-impact printers use technology such as xerography or laser to produce output. Impact printers form images when electronic pulses activate printing elements that are pressed against an inked ribbon and form an image on paper. Non-impact printers use thermal, chemical, electrical or optical technique to form images. Non-impact printers are much faster than impact printers because they involve less physical movements of parts. A speed of 3800 lpm (lines per minute) is very fast for an impact printer but speeds of up to 21,000 lpm are offered with some non-impact printers. Non-impact printers are capable of a wide range of fonts and quality approaching that of book printing compared to impact printers. Non-impact printers are generally too expensive and give high speed high quality printing in comparison with impact printers.

(e) *Flow chart and decision table*: Flow charts are diagrams that represent the logical organization of decisions, the steps in a computer program, the flow of data or information through a system, or the flow of documents through a system. These blue prints are constructed with a standard set of symbols, and some general guidelines are to be followed while preparing these flowcharts. On the other hand, decision tables are used by systems analysts to communicate with programmers about actions to be taken when certain specified conditions are encountered. Decision tables offer a means of standardizing communication about decisions and allow all possible combinations to be considered. No special training is necessary to understand them.

Decision tables are used in conjunction with or in place of flowcharts for problem definition and documentation. Using flowcharts for the analysis and design of complex systems and programs involving many specified conditions and decision paths becomes an extremely difficult process. The flow of data and the logical sequence of the program or system become hard to follow, and errors or omissions may result. Decision tables are used in such cases as a powerful tool for the analysis and design of programs and systems involving complex conditional decision logic.

(f) *Local and Wide Area Network*: LANs or Local Area Networks are communication systems that are used to link the terminal, computers, word processing station and other devices that are located within a compact area such as an office building, or a campus. LANs typically use a star, bus or ring configuration. LANs can be classified into high, medium and low speed categories. Regardless of the type of LAN used at a local site, it must be coordinated

with the communication elements that link geographically dispersed processing centres. WANs or Wide Area Networks are characterized by using modems and the established telephone system to communicate over greater distances than are possible with local area networks. Organizations often lease communication lines from companies like AT & T to make wide are network. Thus, wide area networks include all the networks that are involved in transporting information from one geographic location to another. The scale is much greater than in local network. The basic components in a common wide area network include a host computer, which is linked by various interconnected communications lines to subordinate computers. The host computer is comparable to any public service computer that provides users with electronic mail, online data bases or other services. Wide area networks, also known as global networks, make judicious use of data communication's common carriers throughout the world and/or private microwave links to connect its computers. Hence main points of differences between LAN and WAN are as stated below:

- A LAN is restricted to a limited geographical coverage of a few kilometers but WAN spans greater distances.
- Fewer data transmission errors occur in case of a LAN as compared to a WAN.
- Data transmission speed is much higher in LAN than in WAN.
- In LAN, computers, terminals and peripheral devices are usually physically connected with wires and coaxial cables, whereas in a WAN, there may not be a direct physical connection between various computers.
- The cost to transmit data in a LAN is negligible. However, in WAN, this cost may be very high because transmission medium used is leased lines or public system such as telephone lines, microwave and satellite links.

19. Define the following functions used in MS-EXCEL :

(i) DMAX
(ii) RATE
(iii) ABS
(iv) PPMT
(v) VAR.

ANSWER

(i) **DMAX:** It is a data base function , which returns the largest number in the field of records in the database that matches the conditions you specify.
(ii) **RATE:** It is a financial function, which returns the interest rate per period of a loan or an annuity.
(iii) **ABS:** It is a mathematical function. It returns the absolute value of a number, a number without its sign.
(iv) **PPMT:** It is a financial function, which returns the payment on the principal for a given investment based on periodic, constant payments and a constant interest rate.
(v) **VAR:** It is a statistical function and it is used to estimates variance based on a sample.

20. Write short notes on:

(a) Handling Missing Data in Data Integrity Control
(b) The Final Step/Touch in Power Point Presentation
(c) Factors in Determining the Best File Organisation
(d) Types of Electronic Payment Systems

ANSWER

(a) ***Handling Missing Data in Data Integrity Control***: When a field is null, simply entering no value may be sufficient. Two options for handling or preventing missing data are: using a default value and not permitting missing (null) values. Missing data are evitable. Other methods for handling missing data are:
(i) Substitute an estimate of the missing value.
(ii) Track missing data so that special reports and other system elements cause people to quickly resolve unknown values.
(iii) Perform sensitivity testing so that missing data are ignored unless knowing a value might significantly change results.

(b) ***The Final Step/Touch in PowerPoint Presentation*:** Power point offers solutions for making a presentation complete and for setting up the actual slide show. Some of the solutions are:
(i) *Setting the Slide Timings* – In case of an electronic presentation, the slides can be changed in two ways-either automatically or manually. Power point helps in setting the timings by using the Rehearse Timing button on the slide sorter toolbar.
(ii) *Recording Narration* – To record speech along with a presentation, one can select Record Narration from the Slide Show menu.
(iii) *Drawing on Slides* – Power Point helps in drawing on a slide on the screen, if one wants to emphasize a point during a presentation. Pen tool can be used to write on a slide during a presentation.
(iv) *Customizing a Presentation* – Power Point offers a Customising feature, using which, certain slides can be omitted from a presentation and made relevant to a particular group of audience. This can be done by choosing Custom Shows from Slide Show menu.

(c) ***Factors in Determining the Best File Organisation*** – Several factors must be considered in determining the best file organization for a particular application. They are:
(i) *File volatility* – It refers to the number of additions and deletions to the file in a given period of time.
(ii) *File activity* – It is the proportion of master file records that are actually used or accessed in a given processing run.
(iii) *File interrogation* – It refers to the retrieval of information from a file.

(d) ***Types of Electronic Payment Systems*** – These are number of electronic payment systems and they can be grouped into three based on what information is being transferred online.
(i) Trusted Third Party – It maintains all sensitive information for its clients, which include both buyers and sellers.
(ii) The second type is an extension of the conventional notational fund transfer.
(iii) The third type includes variations of digital cash, electronic money and coins.

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21. Define the following terms briefly:

(i) Volatile Memory
(ii) Network-attached Storage
(iii) Storage Density
(iv) Screen Resolution
(v) Data Transfer Time
(vi) Data Mart
(vii) Port
(viii) Latency
(ix) Alternate Key
(x) Mobile Commerce
(xi) Graph plotter
(xii) Metadata
(xiii) Data warehouse operations
(xiv) Directory
(xv) Syntax of protocol

ANSWER

(i) Volatile memory is a type of memory that requires constant power to maintain the stored information and is typically used only for primary storage.

(ii) Network-attached storage is secondary or tertiary storage attached to a computer which another computer can access over a local-area network, a private wide-area network, or in the case of online file storage, over the Internet.
(iii) Storage density refers to the compactness of stored information. It is the storage capacity of a medium divided with a unit of length, area or volume (e.g. 1.2 megabytes per square centimeter).
(iv) Screen Resolution is one of the most important features used to differentiate display. Most display devices form images from tiny dots - called pixels that are arranged in a rectangular pattern. The more dots available to display any image on - screen, the sharper the image (the greater the resolution) is.
(v) Data Transfer Time is defined as the time taken to activate the read/write head, read the requested data and transmit them to primary memory for processing.
(vi) Data Mart is defined as a database which contains selective data from a data warehouse meant for a specific function or department.
(vii) A Port is a hardware device that allows a series of bits to be transferred to a bus for data input or, inversely, the transfer of data from a bus to the port for data output.
(viii) Latency is the time taken to access a particular location in storage. It is typically measured in nanosecond for primary storage, millisecond for secondary storage, and second for tertiary storage.
(ix) An Alternate Key of any table is simply that candidate key which is not currently selected as the primary key. An alternate key is a function of all candidate keys minus the primary key.
(x) Mobile Commerce (M-commerce) is defined as the buying and selling of goods and services through wireless handheld devices such as cellular telephone and Personal Digital Assistants (PDAs). Known as next-generation E-commerce, M-commerce enables users to access the Internet without needing to find a place to plug in.
(xi) Graph Plotter is a device capable of tracing out graphs, designs and maps into paper and even into plastic or metal plates. Plotters may be driven on-line or off-line wherein a high degree of accuracy can be achieved, even up to one thousandth of an inch.
(xii) Metadata or "data about data", is used to inform operators and users of the data warehouse about its status and the information held within the data warehouse. Examples of data warehouse metadata include the most recent data load date, the business meaning of a data item and the number of users that are logged in currently.
(xiii) Data warehouse operations comprise of the processes of loading, manipulating and extracting data from the data warehouse. Operations also cover user management, security, capacity management and related functions.
(xiv) A Directory is like a drawer in a filing cabinet containing files. A computer disk usually contains multiple directories, if necessary, a directory can also contain other directories. The purpose of directories is to enable the user to partition the computer's disk/storage devices in an organized and meaningful manner.
(xv) Syntax of protocol defines the format of the data being exchanged, character set used, type of error connection used, type of encoding scheme (eg.. signal levels) during data transmission.

22. Give one or two uses of each of the following:

(i) Bit Mapped Devices	(ii) VGA
(iii) Multiplexer	(iv) Middleware
(v) Power Supply Connectors	(vi) AGP Slot
(vii) Live Backup	(viii) Buffering
(ix) ASCII	(x) Artificial Intelligence
(xi) Encryption	(xii) Memo data type

ANSWER

(i) Bit-mapped devices allow each individual pixel on the screen to be controlled by the computer. Thus, any type of image that can be formed from the rectangular grid of dots on the screen (for example, a 640-by-480 grid) is possible.
(ii) VGA or Video Graphics Adapter is a high quality graphics adapter which provides upto 256 colors and also a high resolution. The two typical combinations of resolutions and colors that a VGA can provide are :

- 640 x 480 pixels with 16 colors.
- 320 x 200 pixels with 256 colors.

(iii) The Multiplexer is a device that scans each device to collect and transmit data on a single communication line to the CPU. It also communicates transmission from the CPU to the appropriate terminal linked to the Multiplexer. The devices are polled and periodically asked whether there is any data to transmit.
(iv) Middleware is defined as the network system implemented within the client/server technology. It is all the distributed software needed to allow clients and servers to interact. General middleware allows for communication, directory services, queuing, distributed file sharing, and printing.
(v) The Power Supply Connectors allow the user to connect the power supply unit to the motherboard and provide power for the functioning of the various components that fit on the motherboard.
(vi) AGP Slot is a dedicated slot meant to provide faster access to GP – based device like graphics accelerator cards, thus enhancing the visual experience for the user.
(vii) A Live Backup is carried out by using the BACKUP utility and provides a redundant copy of the transaction log for restart of any system on a secondary machine in the event the primary database server machine becomes unusable.
(viii) When processor executes one program at a time, basic I/O peripherals such as floppy disk drive and line printers are slow compared with the electronic speed of the processor and thus causing an imbalance in the system as a whole. In a multi - programming environment, the buffering enables the CPU to execute one program's instructions while a second program waits for its I/O operations to take place, rather than being idle.
(ix) ASCII stands for American Standard Code for Information Interchange and is used extensively in small computers, peripherals, instruments and communications devices. Microcomputers using 8-bit word length use 7 bits to represent the basic code and the 8th bit is used for parity either 1 or 0.
(x) Artificial intelligence (AI) is a software that tries to emulate aspects of human behavior, such as reasoning, communicating, seeing, and hearing. There are several types of AI, including natural language, voice and visual recognition, robotics, neural networks, and expert systems. Natural language, voice and visual recognition focus on enabling computers to interact more easily and naturally with users. Robotics focuses on teaching machines to replace human labor. Both neural networks and expert systems aim to improve decision-making.
(xi) Encryption allows information to transit the Internet while being protected from interception by eavesdroppers.
(xii) Memo data type is used when the user needs to store more than 255 characters. A Memo field can store up to 65,536 characters. If a user wants to store formatted text or long documents, user should create a OLE Object filed instead of a Memo field.

23. (a) Discuss the concept of a LAN. Why is it required?
(b) What are the pre-requisites in implementing LAN?
(c) Discuss the components of a LAN.

ANSWER

(a) The concept of *Local Area Network* (LAN) enables more and more computers to get connected to provide many useful benefits, such as printer and hard disk sharing, especially when budgets became a constraint. LANs can be used in the manner suited to the organization which owns them, and can be completely independent of the constraints imposed by public telephone authorities, or other public services. Why LAN is required? LAN is required because of the following reasons:

1. Security - Security for programs and data can be achieved using servers that are locked through both software and by physical means. Diskless nodes also offer security by not allowing users to download important data on floppies or upload unwanted software or virus.

2. Expanded PC usage through inexpensive workstation - Once a LAN has been set up, it actually costs less to automate additional employees through diskless PCs. Existing PCs can be easily converted into nodes by adding network interface cards.
3. Distributed processing - Many companies operate as if they had distributed system in place. If numerous PCs are installed around the office, these machines represent the basic platform for a LAN with inter-user communication and information exchange.
4. Electronic mail and Message Broadcasting - Electronic mail allows users to communicate more easily among themselves. Each user can be assigned a mail-box on the server. Messages to other users can then be dropped into the mail-box and read by them when they log into the network.
5. Organizational Benefits - These include reduced costs in computer hardware, software and peripherals, and a drastic reduction in the time and cost of training or re-training manpower to use the systems. It helps managers and executive to communicate with each other more easily and faster, without any logistical constraints. Information flow too becomes a lot smoother with various departments having the ability to access or request for information and data pertinent to them.
6. Data management benefits - Since data is located centrally on the server, it becomes much easier to manage it, as well as back it up. No file is transferred between users through floppies.
7. Software cost and up-gradation - If the organization is concerned about using licensed software purchasing a network version can save a lot of money, since there would be no need to buy multiple copies of the same software for every machine in the organization. Therefore, software upgrades are much easier as any given package is stored centrally on the server.

(b) *Pre-requisites in LAN Implementation* - There are certain features that every LAN should have and users would do well to keep note of these when they decide to implement their own network. These features essentially invoice hardware and software components. Broadly, these are:

1. Compatibility - A LAN operating system must provide a layer of compatibility at the software level so that software can be easily written and widely distributed. A LAN operating system must be flexible, which means that it must support a large variety of hardware. Novell Net Ware is a network operating system that can provide these features, and has today, become an industry standard.
2. Internetworking - Bridging of different LANs together is one of the most important requirements of any LAN. Users should be able to access resources from all workstations on the bridge network in a transparent way; no special commands should be required to cross the bridge. A network operating system must be hardware independent, providing the same user interface irrespective of the hardware.
3. Growth Path and Modularity - One of the most important requirements of a LAN is its modularity. A set of PCs should get easily converted into a LAN which can grow in size simply by adding additional workstations. If more storage is required, one should be able to add another hard disk drive, or another server. If one needs to connect with a user on another LAN, he/she should be able to install a bridge.
4. System Reliability and Maintenance - All computers are prone to system lockups, power failures and other catastrophes. If a centralized processing system goes down, all users connected to it are left without a machine to work on. Such a situation can arise even in a distributed or local area network system. However, a LAN operating system should be powerful enough to withstand accidents.

(c) *Components of a LAN* - A typical LAN running under Novell NetWare has five basic components that make up the network. These are :

- File Server
- Network operating system
- Personal Computers, Workstations or Nodes
- Network Interface Cards
- Cabling

(i) *File Server* - A network file server is a computer system used for the purpose of managing the file system, servicing the network printers, handling network communications, and other functions. A server may be dedicated in which case all of its processing power is allocated to network functions, or it may be non-dedicated which means that a part of the server functions may be allocated as a workstation or DOS-based system.

(ii) *The network operating system* - It is loaded into the server's hard disk along with the system management tools and user utilities. When the system is restarted, NetWare boots and the server comes under its control. Can processing is done on the server, and hence it is called a Passive Device. The larger the network, the more important it becomes to have a high performance server
(iii) *Workstations* - Workstations are intelligent systems attached to the server through the network interface card and the cabling. The dumb terminals used on mainframes and minicomputer systems are not supported on networks because they are not capable of processing on their own. After processing, files are stored back on the server where they can be used by other workstations. The workstation can also be a diskless PC, wherein loading of operating system takes place from the file server.
(iv) *Network interface card (NIC)* - Every device connected to a LAN needs a Network interface card(NIC) to plug into the LAN. For example, a PC may have an Ethernet card installed in it to connect to an Ethernet LAN.
(v) *Network Cabling* - Once the server, workstations and network interface cards are in place, network cabling is used to connect everything together. The most popular type of network cable is the shielded twisted-pair, co-axial and fiber optic cables.

24. (a) Describe how the bulk of removable storage media is managed and its usage controlled?
(b) How the reliability of storage media is monitored?

ANSWER

(a) The storage structure design entails the decisions, which must be made on how to make it linear and to partition the data structure so that it can be stored on some device.
To manage storage media, four functions must be undertaken:

1. To ensure that removable storage media are stored in a secure and clean environment.
2. To ensure that storage media are used for authorized purposes only.
3. To ensure maintenance of storage media in good working condition, and
4. To ensure location of storage media at on-site / off-site facilities.

A storage media can contain critical files and hence should be housed securely in a constant temperature, dust free environment. In case of mainframe operations, a separate room may be required just adjacent to computer room to house storage media required during daily operations, restricting access to the room and fixing the responsibility in the hands of a file librarian. For managing a bulk of removable storage media effectively an automated library system is needed which records the following –

(i) An identifier of each storage medium,
(ii) Location where each storage medium is at present placed,
(iii) Identity of the person responsible for storage medium,
(iv) Identity of the present custodian of the storage medium,
(v) List of files stored on each medium,
(vi) List of authorized persons to access,
(vii) Date of purchase and history of use with history of difficulties in using the storage medium,
(viii) Date of expiry when contents of the storage medium can be deleted,
(ix) Date of last release from and date last return to the file library,

In mainframe environments, file librarians issue removable storage media as per authorized production schedule by transporting the required media themselves to computer room and collecting it after the production runs. In micro computer environments, the extent of control over its use is dependent on the criticality of the data maintained on it. Care should also be taken when multiple files are assigned to a single medium, for an application system reading one file may also read another file containing sensitive data. To reduce the chance of exposure of sensitive data at some point of time, file should be expunged out of storage media as soon as their retention dates expire. Such media can then be reused to store other files, thereby reducing the inventory requirement.

(b) Reliability of storage media should be monitored, especially which are used to store critical files, since the reliability decreases with age. For example, an increasing number of read / write errors are crept in the magnetic tapes and diskettes as these become older and used more. Some of the following measures to monitor the reliability of storage media are:

1. Storage media should not be kept unused for longs, otherwise the possibility of read / writes error occurring with the media increases. With a magnetic tape for example, pressure builds up towards its center on its hub as it grows older. The pressure causes bonding and compacting of the ferromagnetic material from which the magnetic tape is made resulting in unread ability of the tape. Thus a backup storage media need to be managed and should be retrieved at regular intervals and backup files re-written to another fresh medium.
2. When storage media becomes unreliable, it is best to discard it; after ensuring that all sensitive data is removed from the discarded media. Simply deleting the files on the media does not serve the purpose. It may be necessary to carry out bulk erasure followed by writing random bits to the media followed by carrying out of bulk erasure once again.
3. If storage media is required to be sent out side the organization for cleaning or repair, care should be taken to erase any sensitive data contained. The data on magnetic tapes for example, can be erased by degaussing or demagnetization.
4. Removable storage media should be located on-site when these are needed to support production running of application systems and should be located offsite when intended for backup and recovery. The file librarian manages transport of removable storage media to and from off-site locations with a compliance with the backup schedules. Backup schedules are prepared by a team comprised of security administrator, data administrator, application project manager, system development manager, operations manager and the file librarian.

25. (a) What are the elements that are required to be considered in designing of user interface? How the interface design is developed?

(b) Discuss the features of Program Library Management Software.

ANSWER

(a) Elements which have to considered in designing of user interface are as follows –

(i) Source documents to capture data.
(ii) Hard copy output reports.
(iii) Screen layout for source document input.
(iv) Inquiry screens for database queries.
(v) Command languages for decision support systems.
(vi) Query languages for the database.
(vii) Graphic display and color or non-monochromatic display.
(viii) Voice output to answer users or answer queries.
(ix) Screen layout manipulation by mouse or light pen.
(x) Icons for representation of the output.

The interface design is developed as follows –

- Identifying system users and classifying them into homogeneous groups.
- The user group characteristics are understood like whether the system will be handled by novices or experts.
- Eliciting the tasks which the users wish to perform using the system.
- Commencing a preliminary design of the form of interaction that will support these tasks. Prototyping tools are usually employed to refine the design aspect with the users.

(b) Features of Program Library Management System Software are as follows:

1. It provides several functional capabilities to effectively and efficiently manage data center software inventory which includes –
    - ❖ Application Program Code.
    - ❖ System Software Code.
    - ❖ Job Control Statements.
2. It possesses integrity capabilities such that –
    - ❖ Each source program is assigned.
    - ❖ A modification number and a version number are assigned.
    - ❖ It is associated with a creation date.
3. It uses – Password, Encryption, Data Compression, and Automatic backup.
4. It possesses update capabilities with the facilities of Addition, Modification, Deletion and Re-sequencing library numbers.
5. It possesses reporting capabilities for being reviewed by the management and the end users by preparing lists of Additions, Deletions, Modifications, Library catalogue, and Library members attributes.
6. It possesses interface capabilities with the Operating System, Job schedulingSystem, Access control System and Online program management.
7. It controls movement program from test to production status.
8. At last, it changes controls to application programs.