

PAPER – 6 : INFORMATION TECHNOLOGY

QUESTIONS

1. Define the following terms briefly:

- | | | | |
|--------------------|------------------------|-------------------|----------------------------|
| (i) Control Unit | (ii) Secondary Storage | (iii) BCD | (iv) Master File |
| (v) Cache Memory | (vi) CMOS | (vii) USB | (viii) EPROM |
| (ix) Bubble Memory | (x) Full Duplex | (xi) Touch Screen | (xii) Intelligent Terminal |
| (xiii) Smart Card | (xiv) COM | (xv) Seek Time | (xvi) Data Duplication |
| (xvii) Modem | (xviii) HTML | (xix) URL | (xx) Firewall |

2. Convert the following from one number system to another number system along with the working notes:

- (i) $(594)_{10} = ()_2$
- (ii) $(1110011.11)_2 = ()_{10}$
- (iii) $(674)_8 = ()_{10}$
- (iv) $(3592)_{10} = ()_8$
- (v) $(8AB)_{16} = ()_2$
- (vi) $(5CD.50)_{16} = ()_{10}$
- (vii) $(10111.110)_2 = ()_8$
- (viii) $(567)_8 = ()_2$
- (ix) $(110011.1011)_2 = ()_{16}$
- (x) $(325)_8 = ()_{16}$

3. Give one or two uses or reasons for each of the followings:

- (i) Uses of spooling software
- (ii) Uses of parallel port
- (iii) Uses of video controller
- (iv) Uses of voice recognition software
- (v) Uses of EDI
- (vi) Uses of file management software
- (vii) Uses of file pointer
- (viii) Uses of CAD/CAM
- (ix) Uses of gateways
- (x) Uses of communication software
- (xi) Uses of flowcharting
- (xii) Uses of transaction file.

4. Distinguishes between the following:

- (i) Mainframe and Super computer
- (ii) Dynamic RAM and Static RAM
- (iii) Personal computing and Network computing
- (iv) CRT and Flat panel display device
- (v) Laser Printer and Inkjet printer

- (vi) 3rd generation languages and 4th generation languages
 - (vii) Multitasking and Multiprocessing
 - (viii) Hierarchical database structure and Network database structure
 - (ix) WAN and LAN
 - (x) Client Server model and Peer-to-peer model
 - (xi) Audio conferencing and Video conferencing
 - (xii) Intranet and Extranet.
5. (a) Briefly discuss the operations performed in data processing system.
 (b) Explain in brief the different types of computer systems based on their efficiency.
 (c) Discuss the advantages and disadvantages of the computer system.
 6. (a) Discuss various input devices in brief.
 (b) Discuss the procedure to store data on a disk.
 7. (a) Explain in brief the different language translators used in the system.
 (b) Describe the factors that determine the best file organization.
 8. (a) What are the various problems related with the management of file processing system.
 (b) Briefly describes the various components of the database environment.
 (c) Describe the various functions performed by database administrator.
 9. (a) Describe various types of file processing modes.
 (b) Discuss the advantages and disadvantages of ring topology.
 (c) What is Storage Area Network (SAN). Discuss the business challenges that can be used in implementing the SAN.
 10. (a) Briefly describe the applications of e-commerce.
 (b) Discuss the various features of the data centre.
 (c) Describe in brief the challenges faced by the management in establishing a data centre.
 11. (a) A bicycle shop in a city hires bicycles by the day at different rates for different models as given below:

Model No.	Hire rate per day
Model No. 1	Rs. 10
Model No. 2	Rs. 9
Model No. 3	Rs. 8
Model No. 4	Rs. 7

In order to attract customers, the shopkeeper gives a discount of 15 per cent to all those customers, who hire a bicycle for more than one-week period. Further, to attract women customers, he gives additional discount of 10 per cent irrespective of hire period. For every bicycle hired, a security deposit of Rs. 25 must be paid.

Draw a flow chart to print out the details of each customer such as name of customer, bicycle model number, number of days a bicycle is hired for, hire charges, discount and total charges including deposits.

- (b) An electricity distribution company has three categories of consumers namely–
 - (i) Domestic

(ii) Commercial

(iii) Industry.

The charges of electricity per unit consumed by these consumers are Rs. 3, Rs. 4 and Rs. 5 respectively. The computer database of the company has following information:

- Consumer's name
- Category
- Units consumed
- Bill date
- Date of payment.

The company processes bills according to the following criterion.

If the consumer is domestic and pays his bill within 10 days of the bill date, 5% discount is given. If he pays the bill within 15 days, no discount is given. If he makes the payment after 15 days of the bill date, 10% surcharge is levied. For the non-domestic consumers (commercial or industry), corresponding percentage be 10%, 0% and 15% respectively.

Draw a flowchart to calculate the bill amount, discount, surcharge and net amount of the bill for each type of consumer and print it.

12. A wholeseller has three commodities to sell and has three types of customers. The discount is given as per following rules:

- (i) For Govt. orders, 15% discount is given irrespective of the value of the order.
- (ii) For orders of more than Rs. 20,000, an agent gets a discount of 20% and the retailer 15% respectively.
- (iii) For orders of value between Rs. 10,000 and Rs. 20,000, agent gets discount of 15% and the retailer gets 10%.
- (iv) For order of value less than Rs. 10,000, the agent and retailer get discount 10% and 5% respectively.

The above rules do not apply to furniture items. However, in case of furniture items, a flat rate of 10% discount is admissible to all types of customers.

Prepare a limited entry decision table.

13. (a) Describe the different types of Integrity controls used in DBMS.
 (b) Differentiate between the horizontal and vertical partitioning.
14. Describe the objectives and the scope of Information Technology Act, 2000.
15. What is mail-merge? Explain the procedure to create the mail-merge document in brief.
16. (a) Briefly describes the various features offered by electronic spread sheet.
 (b) Write the steps for creating and using macros in the spread sheet.
17. (a) Describe the essential factors that are used in determining the CAAT.
 (b) What are the various test data techniques used in computer audit? Describe in brief.
 (c) Explain the various facilities offered by a standard accounting package.
18. Define the following (MS Word):
 (a) Formatting text and Paragraph.
 (b) Working with tables.
19. Define the following (MS Excel):
 (a) Relative and Absolute cell address.

- (b) Chart wizard.
- 20. Define the following (MS Power Point):
 - (a) Slide master.
 - (b) Slide view.

SUGGESTED ANSWERS/HINTS

1. Define the following terms briefly:
 - (i) Control Unit: It supervises the operations of the entire computer. It selects the program statement from the storage unit, interprets the statement and sends the appropriate electronic impulses to the arithmetic/logic and storage units to carry out the operations required.
 - (ii) Secondary Storage: Secondary or Auxiliary storage is used for holding data and programs not currently in use. The large volume of data is stored in secondary storage devices like magnetic tape drives and magnetic disk drives.
 - (iii) BCD: The decimal weighing is maintained, but the digit is represented by a combination of the binary digits 0 and 1. A minimum of four bits must be used to encode each digit. Hence, each digit is represented by its binary equivalent using four bits.
 - (iv) Master File: It contains relatively permanent records for identification and summarising statistical information. A product file, customer file and employee file are examples of master files.
 - (v) Cache Memory: The cache acts as 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 2 sections—one for data, the other for instructions.
 - (vi) CMOS (Complementary Metal Oxide Semiconductor): The PC uses the CMOS memory to store the date, time and system setup parameters. These parameters are loaded every time the computer is started. It is powered by Lithium Ion battery.
 - (vii) USB: USB stands for Universal Serial Bus. These ports provide the user with higher data transfer speeds for different USB devices like keyboards, mice, scanners or digital cameras.
 - (viii) EPROM: EPROM stands for Erasable Programmable Read Only Memory. EPROM chips can be electrically programmed. Unlike ROM and PROM chips, EPROM chips can be erased and reprogrammed. Erasure is performed by exposing the chip to Ultra-violet light.
 - (ix) Bubble Memory: Data stored in bubble memory is retained when power to the memory is turned off, it can be used for auxiliary storage. It is composed of small magnetic domains (bubbles) formed on a thin single-crystal film of synthetic garnet. The presence or absence of a bubble can be used to indicate whether a bit is "on" or "off".
 - (x) Full Duplex: A full duplex connection can simultaneously transmit and receive data between two stations. It is most commonly used communication mode. A full duplex line is faster than half-duplex mode each time the direction of transmission is changed.
 - (xi) Touch Screen: An invisible microwave beam 'matrix' criss crosses the screen, emanating from holes along the bottom and sides of the display unit. By pressing the finger against a function or program displayed on the screen, the infrared beam is broken at that intersection and the system is activated.
 - (xii) Intelligent terminal: The terminal has an in-built processing capability. It contains not only a storage area but also a microprocessor. The terminal can be programmed to communicate with and instruct the user who is entering data. Thus, intelligent terminals can be used on a stand-alone basis or can be part of a distributed network of terminals.

- (xiii) Smart Card: It resembles credit cards in size and shape; however, they contain a microprocessor chip and memory, and some include a keypad as well. Smart cards are used most frequently to make electronic purchases and to electronically transfer funds between accounts. However, the potential applications for these are abound.
- (xiv) COM: Computer output microfilm (COM) is an output technique that records output from a computer as microscopic images on rolls or sheet film. The images stored on COM are the same as the images, which would be printed on paper. The information is then recorded on sheet film called 16 mm, 35 mm microfilm or 105 mm microfiche.
- (xv) Seek Time: This is the time required to position a movable read-write head over the recording track to be used. If the read-write head is fixed, this time will be zero.
- (xvi) Data Duplication: When the same data (such as a customer's name and address) is recorded and stored in several files, it is known as Data Duplication. This data redundancy or duplication causes problems when data has to be updated.
- (xvii) Modem: Modem stands for Modulator/Demodulator. It is an encoding as well as decoding device used in data transmission. It is a device that converts a digital computer signal into an analog telephone signal (i.e. it modulates the signal) and converts an analog telephone signal into a digital computer signal (i.e. it demodulates the signal) in a data communication system.
- (xviii) HTML: Web pages are created by using Hypertext Markup Language (HTML). HTML lets the creator of a Web page specify how text will be displayed and how to link to other Web pages, files, and Internet services. These links are formally known as hypertext links.
- (xix) URL: It is used to address and access individual Web pages and Internet resources. The format of a URL is: protocol/Internet address/Web page address. The protocol that the Web uses for HTML codes for Web pages is Hypertext Transport Protocol (HTTP).
- (xx) Firewall: These are systems that control the flow of traffic between the Internet and the firm's internal LANs and systems. They are usually packaged as turnkey hardware/software packages, and are set up to enforce the specific security policies that are desired. A firewall is a proven, effective means of protecting the firm's internal resources from unwanted intrusion.

2. (i) $(594)_{10} = (\quad)_2$

2	594	
2	297	0
2	148	1
2	74	0
2	37	0
2	18	1
2	9	0
2	4	1
2	2	0
2	1	0
	0	1

$(594)_{10} = (1001010010)_2$

(ii) $(1110011.11)_2 = (\quad)_{10}$

$$= 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2}$$

$$= 64 + 32 + 16 + 0 + 0 + 2 + 1 + \frac{1}{2} + \frac{1}{4}$$

$$= 115 + 0.5 + 0.25$$

$$= 115.75$$

$(1110011.11)_2 = (115.75)_{10}$

$$\begin{aligned}
 \text{(iii)} \quad (674)_8 &= (\quad)_{10} \\
 &= 6 \times 8^2 + 7 \times 8^1 + 4 \times 8^0 \\
 &= 384 + 56 + 4
 \end{aligned}$$

$$(674)_8 = (444)_{10}$$

$$\text{(iv)} \quad (3592)_{10} = (\quad)_8$$

8	3592	
8	449	0
8	56	1
8	7	0
	0	7

$$(3592)_{10} = (7010)_8$$

$$\text{(v)} \quad (8AB)_{16} = (\quad)_2$$

To convert the given number from Hexadecimal number system to Binary number system, each digit of the number will be represented in Binary form using a group of four bits.

$$= 1000 \ 1010 \ 1011$$

$$(8AB)_{16} = (1000 \ 1010 \ 1011)_2$$

$$\text{(vi)} \quad (5CD.50)_{16} = (\quad)_{10}$$

$$= 5 \times 16^2 + C \times 16^1 + D \times 16^0 + 5 \times 16^{-1} + 0 \times 16^{-2}$$

$$= 5 \times 256 + 12 \times 16 + 13 \times 1 + 5 \times .0625 + 0 \times .03125$$

$$= 1280 + 192 + 13 + 0.3125 + 0$$

$$(5CD.50) = (1485.3125)_{10}$$

$$\text{(vii)} \quad (10111.110)_2 = (\quad)_8$$

To convert the given number from Binary number system to Octal number system, each digit of the number will be represented in Octal form using a group of 3 digit.

$$= 010 \ 111.110$$

$$= 2 \ 7 \ . \ 6$$

$$(10111.110)_2 = (27.6)_8$$

$$\text{(viii)} \quad (567)_8 = (\quad)_2$$

To convert the given number from Octal number system to Binary number system, each digit of the number will be represented in Binary form using a group of 3 digit.

$$= 101 \ 110 \ 111$$

$$(567)_8 = (101 \ 110 \ 111)_2$$

$$\text{(ix)} \quad (110011.1011)_2 = (\quad)_{16}$$

To convert the given number from Binary number system to Hexadecimal number system, each digit of the number will be represented in Hexadecimal form using a group of 4 digit.

$$= 0011 \ 0011.1011$$

$$= 3 \ 3 \ . \ B$$

$$(110011.1011)_2 = (33.B)_{16}$$

$$(x) \quad (325)_8 = (\quad)_{16}$$

To convert the given number from Octal number system to Hexadecimal number system, first convert it into Decimal number system and then Decimal number will be represented in Hexadecimal form.

$$= 3 \times 8^2 + 2 \times 8^1 + 5 \times 8^0$$

$$= 192 + 16 + 5$$

$$= (213)_{10}$$

16	213	
16	13	5
	0	13 = D

$$(325)_8 = (D5)_{16}$$

3. Give one or two uses or reasons for each of the followings:

(i) Uses of Spooling Software

- ❖ The purpose of spooling software is to compensate for the speed differences between the computer and its peripheral devices.
- ❖ Spooling utilities can also be used on the input side, so that programs and data to be processed are temporarily stored in an input spooling area on disk.

(ii) Uses of parallel port: Parallel ports are used to connect external Input/Output devices like scanners or printers. Parallel ports facilitates the parallel transmission of data, usually one byte at a time. Parallel ports use 25 pin RS-232C.

(iii) Uses of video controller

- ❖ It contains the video-dedicated memory and other circuitry necessary to send information to the monitor for display on the screen.
- ❖ Video controllers are used in displaying the graphics and images with more colours and high resolution.

(iv) Uses of voice recognition software: Voice recognition software takes the smallest individual sounds in a language, called phonemes, and translates them into text or commands. One can speak to the computer rather than having to type.

(v) Uses of EDI

- ❖ Most of the purchasing transactions are routine jobs, they can be handled automatically, utilising the staff for more demanding and less routine tasks.
- ❖ Quotes, estimates, order entry and invoicing will proceed more smoothly and efficiently. Orders received electronically ensure that information is available immediately, so that an organisation can respond faster and be more competitive.

(vi) Uses of file management software

- ❖ It lets users and programmers organise data into files and then process those files. This software performs such important processing tasks as information retrieval and report preparation; they are available for both large and small computers.
- ❖ It is used to create and store as many files as necessary for creating reports, and allowing users to search for records having specific characteristics.

(vii) Uses of file pointer: File pointers establish linkage between records and are a basic part of the file organisation of all the database models except the relational model. A pointer is the address of another, related record that is "pointed to" and the pointer directs the computer system to that related record.

(viii) Uses of CAD/CAM

- ❖ Outputs are re-interpretation of the data and can be delivered on video displays, drawings developed on plotters, three dimensional models built by machine tools.
- ❖ It has become possible to shorten the time greatly and to improve procedure for developing and building sophisticated new products, for example, aircraft design.

(ix) Uses of gateways: Gateways relay data from network to network. They are usually used to link LANs of different topologies, e.g., Ethernet and Token Ring, so enabling the exchange of data. A gateway is a collection of hardware and software facilities that enables devices on one network to communicate with devices on another, dissimilar network

(x) Uses of communication software

- ❖ Linking and disconnecting the different devices; automatically dialing and answering telephones; restricting access to authorized users; and establishing parameters such as speed, mode, and direction of transmission.
- ❖ Polling devices to see whether they are ready to send or receive data; queuing input and output; determining system priorities; routing messages; and logging network activity, use, and errors.

(xi) Uses of flowcharting

- ❖ It allows the programmer to compare different approaches and alternatives on paper and often shows interrelationships that are not immediately apparent.
- ❖ A flowchart helps the programmer avoid fuzzy thinking and accidental omissions of intermediate steps. They are the most detailed and are 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.

(xii) Uses of 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 the batch type, the transactions are accumulated for a period and a transaction file is created at the end of the period.

4. (i) Super computers are the largest and fastest computers available but are typically not used for commercial data processing. Instead they are used in specialized areas such as in Defence, aircraft design and computer generated movies, weather research etc. In past, a high clock rate was one of the characteristics that distinguished super-computers from ordinary machines. The high degree of parallelism, i.e., their ability to perform a large number of operations simultaneously makes the super computer distinguishable from the ordinary computer. All modern super-computers contain several processors, which can cooperate in the execution of a single program. Each processor can execute instructions following a program path independently of the others. Parallelism is achieved by decomposing programs into components, known as tasks or threads, which can be executed simultaneously on separate processors.

Mainframe computers are less powerful and cheaper than Super computers. However, they are big general-purpose computers capable of handling all kinds of scientific and business applications. Main frames can process several million instructions per second. A main frame can support more than 1,000 remote terminals. Main frames have large on-line secondary storage capacity. A number of different types of peripheral devices like magnetic tape drive, hard disk drive, visual display units, plotters, printers and telecommunication terminals can be attached with main-frame computers. They also offer the facility of multiprogramming and time-sharing.

- (ii) Dynamic RAM (DRAM) is the most common type of main memory. It is dynamic because 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 (SRAM) is like DRAM but it is a lot faster, larger, and more expensive. It is static because it doesn't need to be continually refreshed. Because of its speed, SRAM is used mainly in a special area of memory called a cache. The Static RAM retains the stored data as long as the power remains in, whereas with dynamic RAM, the stored information disappears after a few milliseconds have elapsed. The power consumption of a dynamic RAM is less than that of a static RAM, which has the advantage of making a higher degree of integration possible.

- (iii) Personal computing is a computer that should be readily available to an individual to perform his or her work at any time. Many tasks for example, word processing, developing graphics for presentations, working with spreadsheets, and keeping personal calendars are performed by personal computer. Some smaller businesses rely only on personal computers for all of their accounting, inventory management, customer database, and transaction processing operations. Personal computers can be connected to each other or to larger computers to form networks.

Network computing: In network computing arrangements, individuals do their own work on personal computers (or workstations), but are linked to other computers through a telecommunication network that allows them to share information and resources with others. Users in these environments may share databases, memos and other messages, and work in progress (such as drafts of documents). They can also share printers, fax machines, and links to external data sources. Providing duplicates of these resources for each of the members of the work group can be very costly for many organizations.

- (iv) Cathode ray tube (CRT) devices use a large tube-type element that looks like the picture tube in a standard TV set. Inside the tube is a gun that lights up the phosphorescent pixels on the screen surface. CRT technology is relatively inexpensive and reliable. CRT-type display devices are rather bulky and limited in the resolution that they provide.

Flat-panel display is most common of these devices that uses either a liquid crystal display (LCD) or gas-plasma technology. To form images, LCD devices use crystalline materials sandwiched between two panes of glass. When heat or voltage is applied, the crystals line up. This prevents light from passing through certain areas and produces the display. Gas-plasma displays, which provide better resolution but are more expensive than liquid crystal displays, use gas trapped between glass to form images. The biggest advantage of flat-panel displays is that they are lightweight and compact. This makes them especially useful for laptop, notebook, and pocket personal computers.

- (v) Ink-Jet printers utilize the dot matrix principle but in stead of pins, set mechanically to form a character. It uses an array of nozzles which spray jets of ink onto the paper. Ink jet printers are available in the market at fairly reasonable prices.

Laser printers use a combined system which utilizes laser and Xerographic photocopying technology. In a laser printer, a beam from a small laser scans horizontally across a charged xerographic selenium drum to build up an invisible electrostatic image of a whole page of text. Laser printer produces not only alphanumeric characters but also drawings, graphics and other requirements. Its output can be very close to professional printing quality.

(vi) Third-Generation Languages (3GLs)	Fourth-Generation Languages (4GLs)
1. Intended for use by professional programmers	May be used by a non-programming end-user as well as a professional programmer
2. Require specification of how to perform Task	Require specification of what task to perform (system determines how to perform the task)
3. Require that all alternatives be specified	Have default alternatives built in; end-user need not specify these alternatives

4. Require large number of procedural instructions	Require far fewer instructions (less than instructions one-tenth in most cases)
5. Code may be difficult to read, understand, and maintain	Code is easy to understand and maintain because of English-like commands
6. Language developed originally for batch processing	Language developed primarily for on-line use
7. Can be difficult to learn	Many features can be learned quickly
8. Difficult to debug	Errors easier to locate because of shorter programs, more structured code, and use of defaults and English-like language
9. Typically file-oriented	Typically data base oriented

- (vii) 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. 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. CPU can function on complementary units to provide data and control for one another. Multiprocessing is used for nation's major control applications such as rail road control, traffic control, or airways etc.

Multi-tasking refers to the operating system's ability to execute two or more of a single user's tasks concurrently. Multitasking operating systems are often contrasted with single-user operating systems. multi-tasking operating systems provide single users with multiprogramming capabilities. This is often accomplished through foreground/background processing.

- (viii) Hierarchical Database Structure : In a hierarchical database structure, records are logically organised into a hierarchy of relationships. A hierarchically structured database is arranged logically in an inverted tree pattern. All records in hierarchy are called nodes. Each node is related to the others in a parent-child relationship. Each parent record may have one or more child records, but no child record may have more than one parent record. Thus, the hierarchical data structure implements one-to-one and one-to-many relationships. The top parent record in the hierarchy is called the root record.

Network Database Structure: A network database structure views all records in sets. Each set is composed of an owner record and one or more member records. This is analogous to the hierarchy's parent-children relationship. Thus, the network model implements the one-to-one and the one-to-many record structures. Unlike the hierarchical mode, the network model also permits a record to be a member of more than one set at one time. The network model allows us to represent one-to-one, one-to-many and many-to-many relationships. The network model also allows us to create owner records without member records. Unlike hierarchical data structures that require specific entrance points to find records in a hierarchy, network data structures can be entered and traversed more flexibly. However, like the hierarchical data model, the network model requires that record relationships be established in advance because these relationships are physically implemented by the DBMS when allocating storage space on disk.

- (ix) Wide Area Networks (WAN) covers a large geographic area with various communication facilities such as long distance telephone service, satellite transmission, and under-sea cables. The WAN typically involves best computers and many different types of communication hardware and software. Multiple user computers connected together are spread over a wide geographic region facilitating communication channels between the machines, usually furnished by a third party (for example, the Telephone Company, a public data network, a satellite carrier).

Local Area Networks (LAN) covers a limited area. A typical LAN connects as many as hundred or so microcomputers that are located in a relatively small area, such as a building or several adjacent buildings. LANs use a shared physical media which is routed in the whole campus to connect various systems. LANs use high-speed media (1 Mbps to 30 Mbps or more) and are mostly privately owned and operated.

(x)	Client-Server model	Peer-to-Peer model
1.	In this model, number of computers, known as clients are connected to a single host computer known as server.	In this model, all the computers are interconnected with each other. There is no concept of server and clients. All computers behave as server as well as clients.
2.	It uses a dedicated server which provides various services to clients like hardware, software and data access. Different types of servers can be File, Fax, Print or Database server.	It uses non-dedicated server. Non-dedicated server can also be used as a node for data entry, processing and output operations.
3.	Clients can share disk storage and printers attached with the server.	All computers can share the data/resources of each other.
4.	It is suitable for large organization having large number of nodes.	It is suitable in small organisation having less number of nodes upto ten.
5.	Data transfer speed is more.	Data transfer speed is less which decreases even further with the increase in number of computers.
6.	Failure of server results in break-down of entire network.	Failure of one computer will not affect the working of other, only the data stored on the faulty computer will not be accessible to other computers.
7.	Server can not be used for data entry/result purposes, hence it can be said that all the computers are not fully employed.	All the computers are fully employed.
8.	Clients are required to be connected with server in a particular structure like Star Network.	Computers can be connected at any convenient point in the network like Ring Network.
9.	Clients can be dumb terminal or Intelligent terminals.	All computers are intelligent terminals.
10.	This architecture is employed where data security is of prime importance.	This architecture is used when security is not a bigger issue.
(xi)	Audio Conferencing: It is the use of audio communication equipments, which allow the user to communicate with geographically dispersed persons. Audio conferencing does not require a computer but requires a two-way audio communication facility.	

Guidelines to make Audio conferencing more efficient are as stated below:

- (a) All the participants must have an opportunity to speak.
- (b) Number of participants must be kept to manageable size.
- (c) Copy of conferencing agenda must be sent to all the participants in advance through FAX.
- (d) Participants must identify themselves.
- (e) Conferencing discussion must be recorded.

- (f) Hard copy of the discussion must be prepared and should be sent to all the participants for approval.

Video Conferencing: In this conferencing, participants can see and hear each other. It uses the television and does not require a computer. Participants gather in specially equipped rooms having audio and video facility.

There are three types of Video Conferencing:

- (a) One way Video and Audio: In this case, audio and video is traveled only in one direction e.g. Television.
- (b) One way Video and Two way Audio: In this case, audio is transferred in both directions but video is transferred one side e.g. discussion of News Reader with field correspondent.
- (c) Two way Video and Audio: In this case, audio and video is transferred in both directions between sender and receiver e.g. discussion of persons between different studios of a News Channel.

- (xii) Intranet is a type of information system that facilitates communication within the organisation, among widely dispersed departments, divisions and regional locations. Intranets connect people together with Internet technology, using web browsers, web servers and data warehouses in a single view. With an Intranet, access to all information, applications and data can be made available through the same browser. The objective is to organise each individual's desktop with minimal cost, time and effort to be more productive, cost efficient, timely and competitive.

Extranet is an extension of an Intranet that makes the latter accessible to outside companies or individuals with or without an Intranet. It is also defined as a collaborative Internet connection with other companies and business partners. Parts of an Intranet are made available to customers or business partners for specific applications. The Extranet is thus an extended Intranet, which isolates business communication from the Internet through secure solutions. Extranets provide the privacy and security of an Intranet while retaining the global reach of the Internet. An Extranet extends the Intranet from one location to another across the Internet by securing data flows using cryptography and authorisation procedures, to another Intranet of a business partner.

5. (a) Data Processing is the restructuring or reordering of data by people or machines, to increase their usefulness and value for some particular purpose. Data processing can be performed manually with the aid of such simple tools as paper, pencil and filing cabinets or electro-mechanically with the aid of unit record machines or electronically with the aid of a computer which is the major concern of the processing work. Certain fundamental operations must be performed while doing data processing. These operations are:

- (1) Recording
- (2) Classifying
- (3) Sorting
- (4) Calculating
- (5) Summarising
- (6) Reporting.

For more details of the above points, students are advised to refer to the study material Chapter-1.1.

- (b) There are three types of computer systems based on the working efficiency. These are discussed below:
- (1) Analog computers 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. Analog computers are very useful in many systems. They are used to control processes in the food and the petroleum industries. As the measurements in analog computers are carried out by a few single purpose devices, the analog computer offers low cost and ease in programming. The main disadvantage of an analog computer is its accuracy factor, and the limited storage capacity. Hence it is not suitable for processing business data.

- (2) Digital computers count and accept letters or numbers through various input devices that convert the data into electric pulses, and perform arithmetic operations on numbers in discrete form. In addition to performing arithmetic operations, they are also capable of (1) storing data for processing, (2) performing logical operations, (3) editing or deleting the input data and (4) printing out the result of its processed routine at high speed. One of the main advantages in the use of digital computers is that any desired level of accuracy can be achieved by considering as many places of decimal as is necessary and hence are most suitable for business applications. The main disadvantage of digital computers is their high cost and the complexity in programming.
 - (3) Hybrid computers are computers that comprise features of analog computers and digital computers. The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations.
- (c) Advantages of Computer system:
- (1) Speed: Computer operations are measured in milliseconds, microseconds, nanoseconds, and picoseconds (one thousandth, one millionth, one billionth, and one trillionth of a second, respectively).
 - (2) Accuracy: Errors do occur in computer-based information systems, but precious few can be directly attributed to the computer system itself. The vast majority can be traced to a program logic error, a procedural error, or erroneous data. These are human errors.
 - (3) Reliability: Computer systems are particularly adept at repetitive tasks. Anything below 99.9% uptime, the time when the computer system is in operation, is usually unacceptable.
 - (4) Memory Capability: Computer systems have total and instant recall of data and an almost unlimited capacity to store these data. A typical mainframe computer system will have many billions of characters stored and available for instant recall.

Disadvantages of Computer systems:

- (1) Program must be reliable: The computer does what it's programmed to do and nothing else. But a program that has operated flawlessly for months can suddenly produce nonsense. Perhaps some rare combination of events has presented the system with a situation for which there's no programmed course of action. Or perhaps the course of action provided by the programmer contains an error that's just being discovered.
- (2) Application logic must be understood: The computer can only process jobs which can be expressed in a finite number of steps leading to a specific goal. Each step must be clearly defined. If the steps in the solution cannot be precisely stated, the job cannot be done. This is why the computer may not be helpful to people in areas where subjective evaluations are important.

6. (a) Various input devices are:

- (1) Keyboard: A microcomputer's keyboard is normally its primary input and control device. One can enter data and issue commands via the keyboard. Besides the standard typewriter keyboard, most micro keyboards have function keys, also called soft keys of a document or worksheet that extend past the bottom, top, or sides of the

screen. This is known as scrolling. The user can use the up and down arrow keys ($\uparrow\downarrow$) to scroll vertically and the left and right keys ($\leftarrow\rightarrow$) to scroll horizontally.

- (2) **Mouse:** The Mouse is a small box, from the bottom of which protrudes a small ball bearing. The ball bearing rotates when the user moves the Mouse across his desk and, as it is linked by cable to the microcomputer, this moves the cursor on the display screen. When the cursor alights on the facility required, the user presses a button on the top of the Mouse and it is activated. A mouse may have one, two or three buttons. A mouse may be classified as a mechanical mouse or an optical mouse, depending on the technology it uses.
- (3) **Touch Screen:** An invisible microwave beam 'matrix' criss crosses the screen, emanating from holes along the bottom and sides of the display unit. By pressing the finger against a function or program displayed on the screen, the infrared beam is broken at that intersection and the system activated. Touch screens are used in information-providing systems.
- (4) **Light Pen:** A light pen 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. A light pen has a photo-detector at its tip. This detector can detect changes in brightness of the screen. When the pen is pointed at a particular point on the screen, it records the instant change in brightness that occurs and informs the computer about this. Light-pens are useful for menu-based applications. Instead of moving the mouse around or using a keyboard, the user can select an option by pointing at it. A light pen is also useful for drawing graphics in CAD.
- (5) **The Track Ball:** A track ball is a pointing device that works like an upside-down mouse. The user rests his thumb on the exposed ball and his fingers on the buttons. To move the cursor around the screen, the ball is rolled with the thumb. Since the whole device is not moved, a track ball requires less space than a mouse. So when space is limited, a track ball can be a boom. Track balls are particularly popular among users of notebook computers.
- (6) **Joystick:** It is a screen pointing input device. It is a vertical lever 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.
- (b) When the new diskettes (or a new hard drive) are purchased, the disks inside are nothing more than simple, coated disks encased in plastic. The disk provides magnetically mapping of the disk space so that the computer can go directly to a specific point on the diskette without searching through data. The process of mapping a diskette is called formatting or initializing.

To store the data, formatting a disk is required to create a set of magnetic concentric circles called tracks. The number of tracks on a disk varies with the type (most high-density diskettes have 80). The tracks on a disk do not form a continuous spiral like those on a phonograph record - each one is a separate circle. Most tracks are numbered from the outermost circle to the innermost, starting from zero. Each track on a disk is also split into smaller parts resulting in short segments, or sectors. All the sectors on the disk are numbered in one long sequence, so the computer can access each small area on the disk with a unique number. A sector is the smallest unit with which any disk drive (diskette drive or hard drive) can work. Each bit and byte within a sector can have different values, but the drive can read or write only whole sector at a time. If the computer needs to change just one byte out of 512, it must rewrite the entire sector.

7. (a) A language translator or language processor is a general term used for any assembler, compiler or other routine that accepts statements in one language and produces equivalent statements in another language. The language processor reads the source language statements one at a time and prepares a number of machine instructions to perform the

operations specified or implied by each source statement. The three most widely used types of language translators are compilers, interpreters, and assemblers.

Compilers: A compiler translates the entire program into machine language before the program is executed. Compilers are most commonly used to translate high-level languages such as COBOL, FORTRAN, and Pascal. Compilers typically result in programs that can be executed much more swiftly than those handled by interpreters.

Interpreters: Whereas compilers translate programs into machine language all at once before programs are run, interpreters translate programs a line at a time as they are being run. With an interpreter, each statement is translated into machine language just before it is executed. Programs written in simple languages such as BASIC are more likely to be interpreted than compiled because these programs are often developed on microcomputers.

Assemblers: Assemblers are used exclusively with assembly languages. They work similar to compilers, translating an assembly language program into object code. Because assembly language programs are usually more machine efficient than those written in high-level languages, a two-step translation process may take place. First, the high-level language is translated to assembly language; then, using an assembler, it is converted to machine language.

For more details of the above points, students are advised to refer to the study material Chapter-6, Section 5.4.

- (b) Several factors must be considered in determining the best file organization for a particular application. These factors are file volatility, file activity, file size, and file interrogation requirements.

- (1) **File volatility:** It refers to the number of additions and deletions to the file in a given period of time. Perhaps even sequential file organization would be appropriate if there were no interrogation requirements.
- (2) **File activity:** It is the proportion of master file records that are actually used or accessed in a given processing run. At one extreme is the real-time file where each transaction is processed immediately and hence at a time, only one master record is accessed. At the other extreme is a file, such as a payroll master file, where almost every record is accessed when the weekly payroll is processed.
- (3) **File interrogation:** It refers to the retrieval of information from a file. If the retrieval of individual records must be fast to support a real-time operation such as airline reservation then some kind of direct organization is required. If, on the other hand, requirements for data can be delayed, then all the individual requests or information can be batched and run in a single processing run with a sequential file organization.
- (4) **File Size:** Large files that require many individual references to records with immediate response must be organized under some type of direct access method. On the other hand, with small files, it may be more efficient to search the entire file sequentially or, with a more efficient binary search, to find an individual record than to maintain complex indexes or complex direct addressing scheme.

8. (a) There are several Management problems of file processing as discussed below:

- (1) **Data Duplication:** Independent data files include a lot of duplicated data; the same data (such as a customer's name and address) is recorded and stored in several files. This data redundancy causes problems when data has to be updated, since separate file maintenance programs have to be developed and coordinated to ensure that each file is properly updated.
- (2) **Lack of Data Integration:** Having data in independent files makes it difficult to provide end users with information for ad hoc requests that require accessing data stored in several different files. Special computer programs have to be written to retrieve data

from each independent file. This is difficult, time consuming, and expensive for the organisations.

- (3) **Data Dependence:** In file processing systems, major components of a system i.e., the organisation of files, their physical locations on storage, hardware and the application software used to access those files depend on one another in significant ways. Thus, if changes are made in the format and structure of data and records in a file, changes have to be made in all the programs that use this file. It is difficult to do it properly, and it results in a lot of inconsistency in the data files.
 - (4) **Other Problems:** In file processing systems, data elements are generally defined differently by different end users and applications. This causes serious inconsistency in the development of programs which access such data. In addition, the integrity (i.e. the accuracy and completeness) of the data is suspected because there is no control over their use and maintenance by authorized end users.
- (b) Components of database environment are:
- (1) **The Data base files:** These files have data elements stored in database file organisation formats. The data base is created in such a way so as to balance the data management objectives of speed, multiple access paths, minimum storage, program-data independence, and preservation of data integrity.
 - (2) **A data base management system (DBMS):** A DBMS is a set of systems software programs that manages the data base files. The DBMS accesses the files, updates the records, and retrieves data as requested. The DBMS ensures that only those areas are accessed for which clearance has been granted. The DBMS has the responsibility for data security which is vital in a data base environment since data base is accessed by many users.
 - (3) **The users:** Users interact with the data base management system indirectly via applications programs or directly via a simple query language. This language enables the user to retrieve data in logical formats on an ad hoc basis. The user's interaction with the data base management system includes the definition of the logical relationships in the database, input and maintenance of data, changing and deletion, and manipulation of data.
 - (4) **A host language interface systems:** This is the part of the DBMS that communicates with the applications programs. The host language interface interprets instructions in high-level language applications programs, such as COBOL and BASIC programs that request data from the files so that the data needed can be retrieved.
 - (5) **The application programs:** These programs perform almost the same functions that they do in a conventional system, but they are independent of the data files and use standard data definitions. This independence and standardization make special purpose program development easier and faster. Application programs, using the host language interface, are usually developed by professional programmers.
 - (6) **A natural language interface systems:** The query language (e.g. SQL) permits online update and inquiry by users who are relatively unsophisticated about Computer Systems. This language is often termed 'English-like' because instructions of this language are usually in the form of a simple command in English, rather than consisting of symbols and equations. Most of the commands of query languages are pre-programmed and are activated when the user keys in combinations of English words to accomplish an inquiry task. Query languages also permit online programming of simple routines by managers who wish to interact with the data.
 - (7) **The data dictionary / directory :** Data dictionary is a centralized depository of information, in a computerized form, about the data in the database. The data dictionary contains the scheme of the data base i.e. the name of each item in the data base and a description and definition of its attributes along with the names of the

programs that use them, and who is responsible for the data; authorisation (access) tables that specify users and the data and programs authorised for their use.

- (8) Online access and update terminals: These may be adjacent to the computer or even thousands of miles away. They may be dumb terminals, smart terminals, or microcomputers.
- (9) The output system, or report generator: This provides routine job reports, documents and special reports. It allows programmers, managers and other users to design output reports without writing an application program in a programming language.

For more details of the above points, students are advised to refer to the study material Chapter-8.5

(c) The various functions performed by the Data Base Administrator (DBA) are:

- (1) DBA is a data base professional who actually creates and maintains the data base, and also carries out the policies developed by the data administrator. The role of the DBA is more technical than that of the DA.
- (2) DBA is responsible for defining the internal layout of the data base and also for ensuring that the internal layout optimises system performance, especially in main business processing areas.
- (3) Defining the contents of the data base is an important part of data base creation and maintenance. The process of describing formats, relationships among various data elements and their usage is called data definition and the DBA uses data definition language (DDL) for this purpose.
- (4) Maintaining standards and controlling access to data base are two other important functions that are handled by the DBA using DDL. The DBA specifies various rules which must be adhered to while describing data for a database.
- (5) The DBA uses access controls to allow only specified users to access certain paths into the data base and thus prevents unauthorised access.
- (6) The DBA also prepares documentation which includes recording the procedures, standards guidelines and data descriptions necessary for the efficient and continued use of the data base environment.
- (7) It is also a duty of the DBA to ensure that the operating staff performs its database processing related responsibilities which include loading the database, following maintenance and security procedures, taking backups, scheduling the database for use and following restart and recovery procedures after some hardware or software failure, in a proper way.
- (8) The DBA also monitors the data base environments. He ensures that the standards for database performance are being met and the accuracy, integrity and security of data is being maintained.
- (9) The DBA is also responsible for incorporating any enhancements into the database environment which may include new utility programs or new systems releases, and changes into internal procedures for using data base etc.

9. (a) The various types of file processing modes are:

- (1) Batch Processing: A batch of transactions is accumulated, batch totals compiled for it, the transactions transcribed on floppy diskette or other media, the floppy diskette file sorted by the key field and processed against the master file to update the latter and produce the desired outputs. Batch total consists of three totals; Record Count, Financial totals and Hash totals.

Record Count is simply the number of transactions in the batch.

Financial total is the total of a financial data field over the batch, for example, total of amount field in an invoice.

Hash total is the total of such an odd data field that is not normally totalled over the entire batch.

- (2) **On-line Systems:** Online processing refers to processing of individual transactions as they occur from their point of origin as opposed to accumulating them into batches. This is made possible by such direct access devices as Magnetic disk and number of terminals connected to, and controlled by, a central processor. This type of processing provides multi access to information files by terminal users and also enables them to update files with transaction data.
 - (3) **Interactive processing:** In this processing mode, a continuous dialogue exists between the user and the computer. It is also called "transaction driven" processing as transactions are dealt with completely on an individual basis through all the relevant processing operations before dealing with the next transaction. Interactive processing allows files to be updated as transactions occur and enquiries to be dealt with on an immediate response basis. The user initiates an inquiry or request for service. The computer responds, the user's next entry is based upon the contents of computer's response. In an interactive system, number of users can receive services from the computer concurrently. For each user, the computer appears to be dedicated entirely to the specific application or request being processed
 - (4) **Real Time System:** The term real time refers to the technique of updating files with transaction data immediately after the event to which it relates occurs. This is in distinction to batch processing which processes related data in batches at pre-defined periods of time. Real time systems are basically on-line system with one speciality in inquiry processing. The response of the system to the inquiry itself is used to control the activity. The system is designed to provide immediate information to monitor the production processes, it is a real-time system. Real-time systems usually operate in multi programming and multi processing. This increases both availability and reliability of the system. CPU's in real time systems should possess the capability of what is known as program interrupts.
 - (5) **Time sharing system:** A time sharing system allows access to a CPU and files through many remote terminals. The Central Computer system is owned by a time sharing vendor, and the users pay for the service monthly. Specific slices of time are allocated to different users in rotation. Multiprogramming is the method of implementing time shared operations. Also, the time sharing systems are the culmination of the man machine interactive mode. When the man is thinking over some response of the computer to his problem, the computer is attending others and is back with him in time. This amounts to conversation between man and machine. Many time sharing systems are structured so that commands from a terminal can interrupt the CPU processing. On any interruption, the CPU immediately stores the status of the program, it is presently executing and begins to process the interrupt command.
- (b) In ring topology, the network cable passes from one node to another until all nodes are connected in the form of a loop or ring. There is a direct point-to-point link between two neighbouring nodes. These links are unidirectional, which ensures that transmission by a node traverses the whole ring and comes back to the node, which made the transmission.

Advantages:

- (1) Ring networks offer high performance for a small number of workstations or for larger networks where each station has a similar workload.
- (2) Ring networks can span longer distances than other types of networks.
- (3) Ring networks are easily extendable.

Disadvantages:

- (1) Relatively expensive and difficult to install.
 - (2) Failure of one computer on the network can affect the whole network.
 - (3) It is difficult to trouble shoot a ring network.
 - (4) Adding or removing computers can disrupt the network.
- (c) A storage area network (SAN) is a dedicated, centrally managed, secure information infrastructure, which enables any-to-any interconnection of servers and storage systems. A SAN:
- (1) Facilitates universal access and sharing of resources.
 - (2) Supports unpredictable, explosive information technology (IT) growth.
 - (3) Provides affordable 24 hours x 365 days availability.
 - (4) Simplifies and centralizes resource management.
 - (5) Improves information protection and disaster tolerance.
 - (6) Enhances security and data integrity of new computing architectures.

There are many business challenges that can be used for implementing the SAN. They are:

- (1) E-business: Securely transforming internal business processes and improving business relationships to expedite the buying and selling of goods, services and information via the Internet.
- (2) Globalization: The extension of IT systems across international boundaries.
- (3) 'Zero latency': The need to exchange information immediately for competitive advantage.
- (4) Transformation: The ability to continually adapt, while immediately accessing and processing information to drive successful business decisions.

10. (a) There are three distinct general classes of e-commerce applications:

- (1) Customer to business: Customer to business e-commerce applications include:
 - ◆ Social portals: Electronic applications enable consumers to find online information about existing and new products and services. This also includes applications that enable consumers to communicate with each other through electronic mail, video-conferencing, and newsgroups.
 - ◆ Transaction portals: These include applications that enable and facilitate the completion of transactions between buyers and sellers. In electronically facilitated consumer-to-business transactions, customers learn about products through electronic publishing, buy products with electronic cash and other secure payment systems, and even have information goods delivered over the network.
- (2) Intra-organisation applications: Intra-organisational e-commerce applications include:
 - ◆ Workgroup communications: These applications enable managers to communicate with employees using electronic mail, videoconferencing, and bulletin boards. The goal is to use technology to increase the dissemination of information, resulting in better-informed employees.
 - ◆ Collaborative publishing: These applications enable companies to organise, publish, and disseminate human resources manuals, product specifications and meeting minutes using tools such as the World Wide Web. The goal is to provide the information to enable better strategic and tactical decision making throughout the firm. Also, online publishing shows immediate and clear benefits like reduced

costs for printing and distributing documentation, faster delivery of information, and reduction of outdated information.

- ◆ Sales force productivity: These applications improve the flow of information between the production and sales forces, and between firms and customers. By better integrating the sales forces with other parts of the organisation, companies can have greater access to market intelligence and competitor information, which can be funneled into better strategy. The goal is to allow firms to collect market intelligence quickly and to analyze it more thoroughly.

(3) Inter-organisation Applications: Inter-organisational e-commerce applications include:

- ◆ Supplier management: Electronic applications help companies reduce the number of suppliers and facilitate business partnerships by reducing purchase order (PO) processing costs and cycle times, and by increasing the number of POs processed with fewer people.
- ◆ Inventory management: Electronic applications shorten the order-ship-bill cycle. If the majority of a business's partners are electronically linked, information once sent by fax or mail can now be instantly transmitted. Businesses can also track their documents to ensure that they were received there by improving auditing capabilities. This also helps to reduce inventory levels, improve inventory turns, and eliminate out-of-stock occurrences.
- ◆ Distribution management: Electronic applications facilitate the transmission of shipping documents such as bills of lading, purchase orders, advanced ship notices and claims, and enable better resource management by ensuring that the documents themselves contain more accurate data.
- ◆ Channel management: Electronic applications quickly disseminate information about changing operational conditions to trading partners. Technical, product, and pricing information that once required repeated telephone calls and countless hours can now be posted to electronic bulletin boards. By electronically linking production-related information with international distributor and reseller networks, companies can eliminate thousands of hours of labour and ensure accurate information sharing.

(b) Features of Data Centres are:

- (1) Size: Data Centres are characterized foremost by the size of their operations. A financially viable Data Centre could contain from a hundred to several thousand servers. This would require a minimum area of around 5,000 to 30,000 square metres. Apart from this, the physical structure containing a data centre should be able to withstand the sheer weight of the servers to be installed inside. Thus, there is a need for high quality construction.
- (2) Data Security: Another issue critical for Data Centres is the need to ensure maximum data security and 100 per cent availability. Data Centres have to be protected against intruders by controlling access to the facility and by video surveillance. They should be able to withstand natural disasters and calamities, like fire and power failures. Recovery sites must be well maintained as it is here that everything in the Data Centre is replicated for failure recovery.
- (3) Availability of Data: The goal of a Data Centre is to maximize the availability of data, and to minimize potential downtime. To do this, redundancy has to be built in to all the mission critical infrastructure of the Data Centre, such as connectivity, electrical supply, security and surveillance, air conditioning and fire suppression.
- (4) Electrical and power systems: A Data Centre should provide the highest power availability with uninterrupted power systems (UPS).

- (5) Security: Physical security and Systems security are critical to operations. Thus, it should provide both types of security measures to ensure the security of equipment and data placed at the Data Centre.

(a) Physical security: It can be achieved through

- ◆ Security guards.
- ◆ Proximity card and PIN for door access.
- ◆ Biometrics access and PIN for door access.
- ◆ 24 x 365 CCTV surveillance and recording.

(b) Data security: Data security within a Data Centre should be addressed at multiple levels

- ◆ Perimeter security: This is to manage both internal and external threats. This consists of firewalls, intrusion detection and content inspections, host security, anti-virus and access control and administrative tools.
- ◆ Access management: This is for both applications and operating systems that host these critical applications.

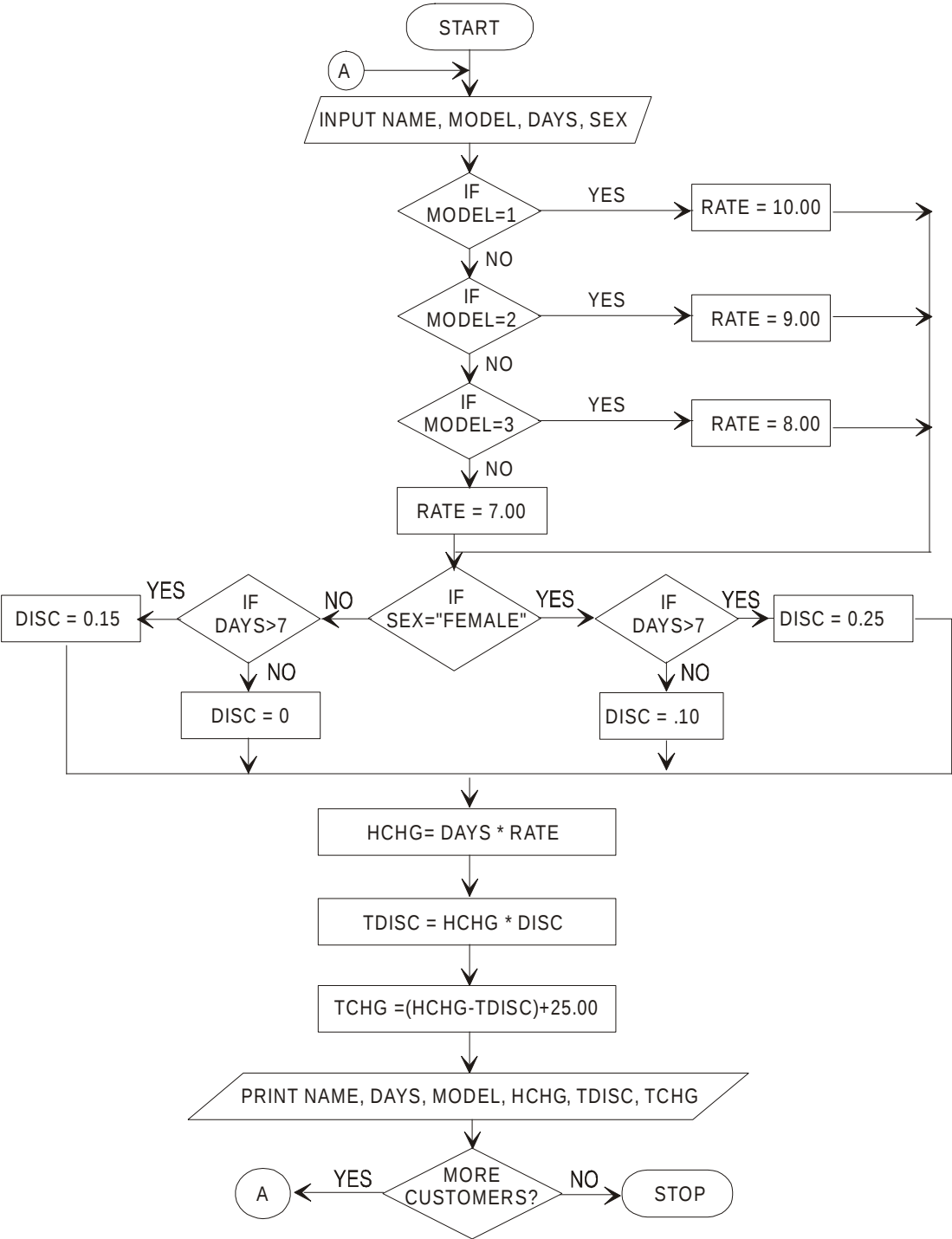
(c) Challenges faced by the management are:

- (1) Maintaining a skilled staff and the high infrastructure needed for daily Data Centre operations: A company needs to have staff which is expert at network management and has Software / OS skills and hardware skills. The company has to employ a large number of such people, as they have to work on rotational shifts. The company would also used additional cover in case a person leaves.
- (2) Maximising uptime and performance: While establishing sufficient redundancy and maintaining watertight security, Data Centres have to maintain maximum uptime and system performance.
- (3) Technology selection: The other challenges that enterprise Data Centres face is technology selection, which is crucial to the operations of the facility keeping business objectives in mind. Another problem is compensating for obsolescence.
- (4) Resource balancing: The enterprise chief technical officer today needs to strike a working balance between reduced operational budgets, increased demands on existing infrastructure, maximizing availability, ensuring round-the-clock monitoring and management, and the periodic upgrades that today's technology demands.

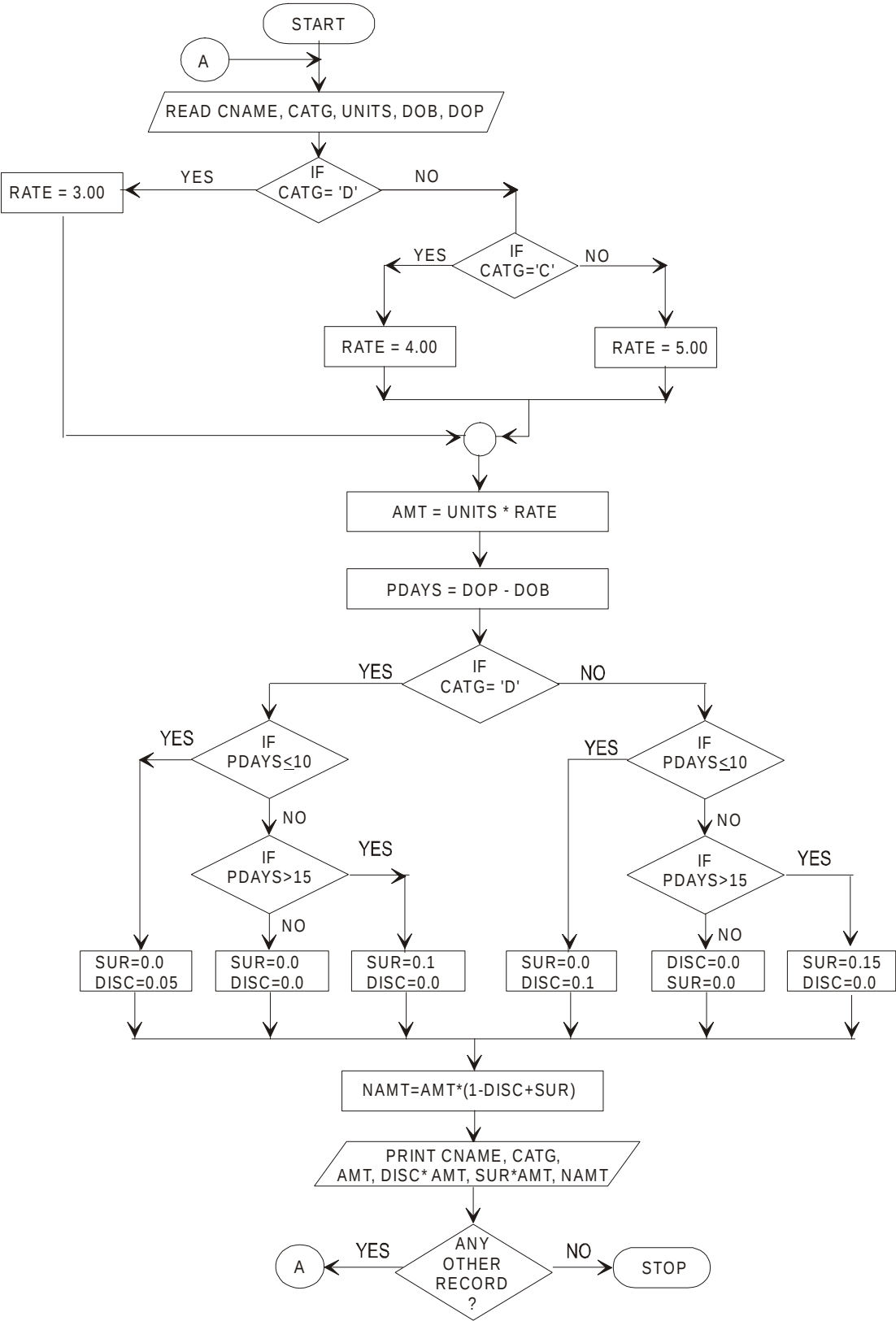
11. Figures of 11.(a) & (b) on page nos. 89 and 90.

12. Limited Entry Decision Table

Conditions	Rule Number							
	1	2	3	4	5	6	7	8
Order : < 10,000	–	N	N	N	N	Y	Y	–
≥ 10,000 and < 20,000	–	N	N	Y	Y	N	N	–
> 20,000	–	Y	Y	N	N	N	N	–
Customer : Govt.	Y	N	N	N	N	N	N	–
Agent	N	Y	N	Y	N	Y	N	–
Retailer	N	N	Y	N	Y	N	Y	–
Product : Furniture	N	N	N	N	N	N	N	Y
Action								
Discount of 5%							X	
10%					X	X		X
15%	X		X	X				
20%		X						



(b)



13. (a) Different Types of Integrity Controls used in DBMS are:

- (1) **Default value:** A default value is the value of a field that will assume unless a user enters an explicit value for an instance of that field. Assigning a default value to a field can reduce data entry time. Once entry of a value can be skipped and it can also help to reduce data entry errors for the most common value.
- (2) **Range control:** A range control limits the set of permissible values a field may assume. The range may be a numeric lower to upper bound or a set of specific values. Range controls must be used with caution since the limits of the range may change over time.
- (3) **Null value control:** A null value is an empty value. Each primary key must have an integrity control that prohibits a null value. Any other required field may also have a null value control placed on it if that is the policy of the organization. Many fields legitimately may have a null value, so this control should be used only when truly required by business rules.
- (4) **Referential integrity:** Referential integrity on a field is a form of range control in which the value of that field must exist as the value in some field in another row of the same or different table. That is, the range of legitimate values comes from the dynamic contents of a field in a database table, not from some pre-specified set of values.

- (b) Horizontal partitioning breaks a relation into multiple record specifications by placing different rows into different records based upon common column values. Each file created from the partitioning has the same record layout. Horizontal partitioning makes sense when different categories of rows of a table are processed separately. Horizontal partitioning can also be more secure since file level security can be used to prohibit users from seeing certain rows of data. Also, each partitioned table can be organized differently, appropriate for how it is individually used. It is likely also faster to recover one of the partitioned files than one file with all the rows. In addition, taking one of the partitioned files out of service because it was damaged or so, it can be recovered still allows processing against the other partitioned files to continue. Finally, each of the partitioned files can be placed on a separate disk drive to reduce contention for the same drive and hence improve performance across the database.

Vertical partitioning distributes the columns of a relation into separate files, repeating the primary key in each of the files. Thus, neither horizontal nor vertical partitioning prohibits the ability to treat the original relation as a whole. Combinations of horizontal and vertical partitioning are also possible. This form of demoralization — record partitioning — is especially common for a database whose files are distributed across multiple computers. Vertical partitioning involves creating tables with fewer columns and using additional tables to store the remaining columns. Normalization is a process that inherently involves vertical partitioning.

14. (a) The objectives of the Information Technology Act, 2000 are:

- (1) To grant legal recognition for transactions carried out by means of electronic data interchange and other means of electronic communication commonly referred to as “electronic commerce” in place of paper based methods communication;
- (2) To give legal recognition to Digital Signature for authentication of any information or matter which requires authentication under any law;
- (3) To facilitate electronic filing of documents with Government departments.
- (4) To facilitate electronic storage of data;
- (5) To facilitate and give legal sanction to electronic fund transfers between banks and financial institutions
- (6) To give legal recognition for keeping books of account by Bankers in electronic form.

- (7) To amend the Indian Penal Code, the Indian Evidence Act, 1872, the Bankers' Book Evidence Act, 1891 and the Reserve Bank of India Act, 1934.

Scope of The Act And Definitions [Chapter I]

This Act is called the Information Technology Act, 2000.

It shall extend to the whole of India and, unless otherwise provided in the Act, it applies also to any offence or contravention thereunder committed outside India by any person.

It was enforced by the Central Government from October 17, 2000.

For more details of the above points, students are advised to refer to the study material Chapter-13.2 & 13.3

15. It is a tool for producing repetitive documents. It gives the flexibility while sending letter and then personalising each copy of it with information such as names, addresses, dates. etc.

Mail Merge is built around two sets of components – main document and the data source. The main document is a form letter. It contains merge fields (or field names) where data would be merged. There are two documents for establishing Mail Merge i.e. the main document and the data source. The process of mail merge always starts with the main document.

STEP 1 – Setting up the Main Document

STEP-2 – Setting up the Data Source

STEP 3 – Editing the Data Source

STEP 4 – Addition of fields to the Main Document and Printing of the Merge Document.

For more details of the above points, students are advised to refer to the study material Chapter-16.6.

16. (a) It is a powerful automated general purpose specification software. It can be used to solve almost any problem involving numbers and formulae. It has mathematical, statistical and financial functions that permit the user to analyze the data contained on the spreadsheet quickly, easily and accurately.

Spreadsheet graphics permits presentation of complex numeric information contained within an electronic spreadsheet in a more comprehensive form using charts and graphs. They are easy to use and are user friendly. They have built in commands for performing many common functions and thus can process and analyze data quickly. The data management software in electronic spreadsheet allows the use of spreadsheet commands to sort, search and extract selected data and later on use it in a variety of ways, including mailing lists, personnel lists, work schedules, training schedules, customer/client lists, rate tables and daily/weekly logs etc.

- (b) Macro is a small program that carries out pre-defined and pre-recorded series of steps by giving a few keyboard shortcuts. Macro is just a way of doing your work in a series of steps, which it carries out automatically once it is triggered. It can be very easily said that a macro is like a batch file created in DOS. It contains a series of commands. So, as and when a macro is called and run, the instructions given in it are executed one by one. A macro automates your tasks, thus saving a lot of your precious time.

Different steps to create a macro are:

- (1) Select 'Tools / Macro' option from the main menu.
- (2) Select 'Record New Macro' option from the cascading menu. It would display 'Record Macro' dialog box
- (3) Name the macro under which you want to save it. Name to a macro can be given in 'Macro Name' box. A long name upto 256 characters can be given to a macro.
- (4) After assigning a name, you are required to give a keyboard shortcut to it. If, any lower-case alphabet is given in the 'shortcut key' box, then the macro can be executed by

pressing the <Ctrl + 'alphabet'> keys together. However, if an uppercase alphabet is used, then you need to press <Shift + Ctrl + 'alphabet'> keys together.

- (5) Now, we proceed on to the 'Store Macro in' box. If you want to use the macro that you are now trying to create in the current workbook only, then select the option 'This Workbook' from the drop-down list. However, if you want to make your macro available to other workbook, then select 'New Workbook' option from the drop down list.
- (6) In the 'Description' box, give some relevant and important details about your macro like the date on which macro was recorded, the owner of the macro, the purpose for which the macro has been created, etc.
- (7) Now, as and when all the relevant details are filled in the 'Record Macro' dialog box, click at the <OK> button. A very small 'Stop Recording' toolbar will appear on the screen.

Use the macro are:

- (1) If a shortcut key has been assigned to your macro, then it can be activated by pressing <Ctrl+ 'key'> or <Shift+Ctrl+'key'> depending upon the case of the 'key'.
- (2) A macro can also be run by selecting 'Tool/Macros/Macros' from the main menu. Then, click at the macro name that you want to execute. Once the macro starts running, you can stop it abruptly in between by pressing the 'Esc' key.

For more details of the above points, students are advised to refer to the study material Chapter-17.11.

17. (a) Important Factors determining the use of CAATs are:

- (1) Computer Knowledge, Expertise, and Experience of the Auditor: The auditor should have sufficient knowledge to plan, execute and use the results of the particular CAAT adopted. The level of knowledge required depends on the complexity and nature of the CAAT and of the entity's accounting system.
- (2) Availability of CAATs and Suitable Computer Facilities: The auditor should consider the availability of CAATs, suitable computer facilities and the necessary computer-based accounting systems and files. The auditor may plan to use other computer facilities when the use of CAATs on the entity's computer is uneconomical or impractical.
- (3) Impracticability of Manual Tests: Many computerized accounting systems perform tasks for which no visible evidence is available and, in these circumstances, it may be impracticable for the auditor to perform tests manually. The lack of visible evidence may occur at different stages in the accounting process.
- (4) Effectiveness and Efficiency: The effectiveness and efficiency of auditing procedures may be improved through the use of CAATs in obtaining and evaluating audit evidence. In evaluating the effectiveness and efficiency of a CAAT, the auditor may consider the life cycle of the CAAT application. The initial planning, design and development of a CAAT will usually benefit audits in subsequent periods.
- (5) Timing: Certain computer files, such as detailed transaction files, are often retained only for a short time, and may not be available in machine readable form when required by the auditor. Thus, the auditor will need to make arrangements for the retention of data required by him or he may need to alter the timing of his work which requires this data.

(b) The various test data techniques are:

- (1) Test Packs: The use of audit test packs may be defined as: "the controlled application of auditor's test data (live or dummy) to client application program procedures". A small sample of data is processed through the computer and the output is compared with manually generated output using the same data. It requires little computer expertise, at

least for simple batch systems. The test data should be small enough to enable results to be computed manually for comparing with the computer-produced results. A test pack may provide the only means of ensuring that the program procedures are operating consistently throughout the period in such a case.

- (2) **Integrated Test Facility (ITF):** Integrated test facility (ITF) is a particular form of test data involving the establishment of a “dummy” entity through which data may be processed. For instance, a fictitious trading branch might be set up. Once the dummy entity is established, the auditor can input transactions and process these using the client’s live system alongside the client’s live data. It will therefore be necessary to delete the test transactions from the system after the test has been performed. As with all test packs, the output produced is compared with predicated results to determine whether the programme procedures being tested are operating correctly.
- (3) **Data File Interrogation:** The use of Data Interrogation method to interrogate financial data files, is a form of substantive testing, as it involves the direct examination of transactions and balances. If the client is storing data on magnetic media then data can be accessed and retrieved from the files by audit interrogation program.

For more details of the above points, students are advised to refer to the study material Chapter-19.4.

- (c) The facilities offered by a Standard accounting package are:

- (1) To create company profile.
- (2) To maintain list of accounts (single and multiple group).
- (3) To create ledger (single & multiple).
- (4) To create entry like voucher entry, sales entry, receipt, payment, journal entry, etc.
- (5) To prepare reports like profit and loss account, balance sheet.

18. (a) Formatting Text and Paragraphs

- (1) **Modify Font:** Modifying the text font, its size, type and colour are some ways to enhance the look of the text. Font refers to the print type, style and size of characters [letters, number, etc] used in printing. The use of different fonts changes the look of the text.
- (2) **Paragraph Alignment:** Alignment of lines for the written text is the most common convention followed by writers even before the advent of the printing press. Each line of written matter on a page maintains a constant horizontal distance from the left edge of the page. Word makes alignment effortless even while offering four types of alignment to text. They are Left, Right, Centre and Justify.
- (3) **Indenting & Line spacing:** When margin settings are made, it determines the width of the text area. In other words, the distance of the text from the edge of the page. By using indenting, the selected paragraphs stand out from other text in your document. Increasing or decreasing the indent alters the distance of the text from the margins. You can create indents in which all the lines in a paragraph are indented either to the right or to the left. Word also offers you some special indentation features like ‘First-line’ only and ‘Hanging’ indents.
- (4) **Drop Cap:** The first character of a word at the beginning of a chapter or article is enlarged, often reaching to the lines below it. In Word, this kind of formatting of the first letter in a paragraph as a large initial is called Drop Cap or Dropped Capital Letter.
- (5) **Tab:** While writing business letters, proposals, project reports and technical documents, it becomes necessary to present some data in a tabular fashion. It is possible to use the space bar to present the data in a tabular form. Word allows you to change the tabs to suit your requirement. Depending on the size of the text you intend to put in each tab column, the width of the tab can be specified.

(6) **Numbers and Bullets:** In word, we only need to begin a list with a number, the subsequent paragraphs will automatically be numbered sequentially every time we press Enter. Similarly, Word allows the use of bullets. It is even possible to convert number to bullets and bullets to numbers in our documents.

(7) **Section Breaks & Page Breaks:** A 'Section' refer to those pages in a document that have the same number of columns and share a common margin, header and footer and have the page numbers in sequence. Page sections can be inserted either manually or automatically. Manual breaks can be set using the break dialog box.

Word recognizes four types of section breaks – Next Page, Continuous, Even page and Odd Page.

(8) **Headers & Footers:** While preparing a Report or a Proposal, we want some information to appear on every page, for example, your company name, the report title or the date of the proposal etc. This kind of information would naturally appear either in the top or bottom margin. We can insert this using the Header and Footer option. Headers are placed in the top margin while footers are placed in the bottom margin of a page.

For more details of the above points, students are advised to refer to the study material Chapter-16.2.

(b) **Working With Tables**

Table is simply the arrangement of information in rows and columns.

(1) **Creating Tables:** There are several ways to insert tables in a document.

- ◆ Using the Insert Table button.
- ◆ Using the Table/Insert Table option.
- ◆ Using the Table/Convert Text to Table option.
- ◆ Using 'Draw Table' Tool.

(2) **Adding Rows and Columns**

(3) **Deleting rows and columns**

(4) **Resizing Rows and Columns**

(5) **Autofit**

For more details of the above points, students are advised to refer to the study material Chapter-16.5

19. (a) **Relative and Absolute cell address**

When a formula entered in a cell that 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 the other cell. If a formula requires a cell address, which should not change even when the formula is copied 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:

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

(b) Chart Wizard

- (1) First step, a dialog box with a list of the various chart types are listed. In case the chart you require is not in the list, you can select the Custom Types tab. This presents you with a long list of built in custom chart types.
- (2) In the second step, the Chart Wizard allows you to reselect or change the data range for the chart using the data range text box. A sample chart is also displayed for your preview. We can also change the names of the various data series.
- (3) In third step, after selecting the chart type and deciding on the data ranges, the chart needs to be fine-tuned. The Chart Wizard offers a wide range of choice in the third stage to do exactly that.
- (4) Finally, you have to decide on the destination for your Chart – whether you want it on the same worksheet or would like to have it on a new sheet. The completed chart is then placed in the desired location.

20. (a) Slide Master

By using the slide master, it is possible to change the design of the slide layout and format the text on each slide using the slide master. It holds the background items for each slide. The changes made to a Slide master are reflected on each slide of the presentation. The Slide master controls the format and placement of titles, text and graphic objects on slides. The Slide master can be accessed from the Views menu, Master option.

For more details of the above points, students are advised to refer to the study material Chapter-18.5

(b) Slide View

PowerPoint comes with different views to help you create your presentations better. It offers five views:

- (1) Normal View
- (2) Outline View
- (3) Slide View
- (4) Slide Sorter View
- (5) Slide Show View

Each view offers a different way to look at your presentation and modify it. The various views using the buttons on the left hand corner of the horizontal scroll bar.

A new type of view feature, the Tri-Pane View comes with the new version of PowerPoint. This view allows you to view 3 different aspects of your presentation at the same time in one screen. Three views of the five views in PowerPoint come with the tri-pane view – the Normal View, the Outline and Slide view.

For more details of the above points, students are advised to refer to the study material Chapter-18.3.