

PAPER – 6 : INFORMATION TECHNOLOGY AND STRATEGIC MANAGEMENT

SECTION – A : INFORMATION TECHNOLOGY

QUESTIONS

1. Define the following terms briefly:

(i) Data Bus	(ii) WORM disk	(iii) RISC
(iv) Spooling Software	(v) PROM	(vi) Internet Browser
(vii) Text Editor	(viii) CPU Slot	(ix) Bubble Memory
(x) Barcode Reader	(xi) Shareware	(xii) Data Dictionary
(xiii) SQL	(xiv) DDL Compiler	(xv) Data Transformation
(xvi) String	(xvii) Router	(xviii) Transport Layer
(xix) Network Protocol	(xx) Middleware	(xxi) FTP server
(xxii) Intrusion Detection System (IDS)		(xxiii) Web Page
(xxiv) HTML	(xxv) Bluetooth	(xxvi) DSL
(xxvii) Site Blocking		
2. Convert the following from one number system to another number system along with the working notes :

(i) $(1101011)_2$	=	$()_{10}$
(ii) $(692)_{10}$	=	$()_2$
(iii) $(110011.11)_2$	=	$()_{10}$
(iv) $(346.25)_{10}$	=	$()_2$
3. Distinguish between the following:
 - (i) Multiprogramming and Multitasking
 - (ii) Mainframe and Mini computer
 - (iii) First Generation and Second Generation Languages
 - (iv) Windows Vista and Windows 7.0
 - (v) Hierarchical and Network database structure
 - (vi) Primary Key and Secondary Key
 - (vii) Online Backup and Live Backup
 - (viii) External and Internal Database View
 - (ix) Information Warehouse Database and Text Database

- (x) Synchronous and Asynchronous Transmission
- (xi) Client Server and Peer-to-Peer Architecture
- (xii) Bus and Mesh Topology
- (xiii) Single tier and Two tier system Architecture
- (xiv) Strategic SCM and Tactical SCM
- (xv) Flowchart and Decision Table

CPU

4. (a) Discuss in brief, various components of a CPU.
- (b) What do you mean by Port? Describe various types of ports available in a motherboard.

Storage Devices

5. (a) Discuss various characteristics of storage on the basis of which storage devices can be classified.
- (b) Describe the various factors which determine the storage capacity of a magnetic disk.

Secondary Storage Devices

6. Discuss various types of optical laser disks used in storing the large amount of data. How the data is stored on optical laser disk? Explain in brief.

Display Devices & Types of Computer Output

7. (a) Describe various types of computer terminals and their uses in brief.
- (b) Discuss in brief the methods of producing computer output.

Programming Languages and Language Translators

8. (a) Discuss the advantages and disadvantages of 1st and 2nd generation of computer languages.
- (b) What are Language Translators? Describe in brief, each of these language translators.

Application Software

9. (a) Define an Expert System. Describe the components of an expert system.
- (b) Discuss various advantages and disadvantages of an expert system.

File Organization

10. (a) Discuss the advantages and disadvantages of sequential file organization.

- (b) Discuss the important features of Index sequential file organization method.

Data Warehousing and Data Mining

11. (a) Discuss in brief the components used in data warehousing.
(b) Describe in brief the various stages involved in the process of data mining.

Document & Program Library

12. (a) Discuss the features of Program Library Management System software.
(b) What are the elements that are required to be considered in designing of user interface? How is the interface design is developed? Explain.

Components of Network

13. (a) Describe any five communication interface devices in brief.
(b) What is communication software ? Discuss various functions of communication software in brief.

Transmission Technology

14. (a) List various features of Synchronous transmission.
(b) Discuss various data transmission modes in brief.

Local Area Network

15. (a) Describe various factors which have contributed to the growth of Local Area Network(LAN).
(b) Discuss the various attributes of Local Area Network (LAN).

E-Commerce

16. (a) Discuss the role of Internet in the development of E-Commerce.
(b) Explain general management concerns in E-Commerce.

Customer Relationship Management

17. (a) What are different factors that determine good CRM program ? Describe in brief.
(b) What are the various purposes of a CRM.

Electronic Data Interchange

18. (a) What do you mean by EDI? Discuss various advantages of EDI.
(b) What is Electronic Fund Transfer (EFT)? Describe, in brief, the different EFT systems in operations.

Flowcharting

19. A book publisher of Accounts and Computer books offers discount to customers on the basis of Customer type and Subject as detailed below:

Customer type	Subject	Discount (%)
Book seller	Accounts	10
	Computer	20
Library	Accounts	5
	Computer	10

If number of copies purchased is more than 10, then additional discount of 2% is allowed irrespective of the customer type and subject.

It is also assumed that there are 25 customers and complete details of each customer like customer name, type, subject, number of copies and unit price is required to be entered through the console.

Draw a program flow chart to calculate and print the net amount paid by each customer along with customer name. Also print the total discount allowed to all the customers.

Decision Table

20. For calculating the delivery charges, customers are divided into two categories, those whose sales region code is SRC100 or above and those with the code of less than SRC100.

If the code is less than SRC100 and the invoice amount is less than ₹ 50,000, the delivery charge to be added to the invoice total is ₹ 500. But if the invoice value is for ₹ 50,000 or more, the delivery charge is ₹ 1000.

If the code is equal to or greater than SRC100, the corresponding delivery charges are ₹ 250 and ₹ 150 respectively.

Required :

Prepare a decision table of the above procedure.

SUGGESTED ANSWERS/HINTS

- (i) **Data Bus:** The data bus is an electrical path that connects the CPU, memory, and the other hardware devices on the motherboard. In fact, the bus is a group of parallel wires. The number of wires in the bus affects the speed at which data can travel between hardware components. For example 8 bit, 16 bit and 32 bit data bus is used to transfer 1, 2 and 4 bytes respectively at a time.

- (ii) **WORM Disk:** It refers to Write Once, Read Many optical laser disks, or WORM disks. Once the data has been written to the medium, they only can be read, not updated or changed. When data is written to a WORM drive, physical marks are made on the media surface by a low-powered laser and since these marks are permanent, they cannot be erased. Companies generally store their proprietary information in WORM disk. These are 3½ inch diskette of 200 MB capacity onwards.
- (iii) **RISC:** RISC or Reduced Instruction Set Computing is an architecture of CPU which results in faster processing of instructions for workstations compared to microprocessor based personal computers.
- (iv) **Spooling Software:** The purpose of spooling software is to compensate for the speed difference between the computer and its peripheral devices such as input and output devices. These programs take the results of computer programs and move them from primary memory to disk. It is used in large system and network computing environment.
- (v) **PROM:** Programmable read only memory is a non-volatile memory which allows the user to program the chip with a PROM writer. The chip can be programmed once, thereafter, it cannot be altered.
- (vi) **Internet Browser:** It is software application that enables a user to display and interact with text, images and other information typically located on a web page at a website on the world wide web or local area network. Web browsers allow a user to quickly and easily access information provided on many web pages at many websites by traversing these links. Web browsers available for personal computers include Microsoft Internet Explorer, Mozilla Fire fox, Apple Safari, Netscape, and Opera.
- (vii) **Text Editor :** Text editors are programs that allow text in a file to be created and modified. They are most useful to professional programmers, who constantly face the problems of cutting and pasting programs together, changing data files by eliminating certain data fields, changing the order of certain data fields, adding new data fields, and changing the format of data. Text editors lack the extensive text-formatting and document-printing capabilities found on most word processors.
- (viii) **CPU Slot :** A CPU socket or CPU slot is an electrical component that is attached to a printed circuit board (PCB) and is designed to house a microprocessor. It provides many functions, including providing a physical structure to support the CPU, providing support for a heat sink, facilitating replacement (as well as reducing cost) and most importantly forming an electrical interface both with the CPU and the PCB. CPU sockets provide an advantage over directly attaching CPUs to the PCB by making it easier to replace the processor in the event of a failure.
- (ix) **Bubble Memory :** Bubble memory is composed of small magnetic domains (bubbles) formed on a thin single-crystal film of synthetic garnet. These magnetic bubbles, which are actually magnetically, charged cylinders, only a few thousandths of a centimeter in

size, can be moved across the garnet film by electric charges. The presence or absence of a bubble can be used to indicate whether a bit is “on” or “off”. Since data stored in bubble memory is retained when power to the memory is turned off, it can be used for auxiliary storage. Bubble memory has high potential because of its low production costs and its direct access capabilities, thus it may become widely employed as a main memory technology.

- (x) **Bar Code Reader** : It is a device which converts the bar code - a pattern of printed bars on products, into a product number by emitting a beam of light, frequently a laser beam, which reflects off the bar code image. A light-sensitive detector identifies the bar code image by recognizing special bars at both ends of the image. Once the detector has identified the bar code, it converts the individual bar patterns into numeric digits. The special bars at each end of the image are different, so the reader can tell whether the bar code has been read right side up or upside down.
- (xi) **Shareware**: Shareware is a software developed by individual and small companies that cannot afford to market their software worldwide or by a company that wants to release a demonstration version of its commercial product. Shareware software often is disabled in some way and has a notice attached to explain the legal requirements for using the product.
- (xii) **Data Dictionary**: A Data Dictionary is a set of meta-data that contains definitions and representations of data elements. It maintains information pertaining to structure and usage of data and meta-data. Each piece of data and various synonyms of data field are determined in consultation with database users.
- (xiii) **SQL or Structured Query Language**: A query language is a set of commands to create, update and access data from a database allowing users to raise adhoc queries/questions interactively without the help of programmers. It is a computer programming language used to manipulate information in relational database management systems (RDBMS). It has 3 parts namely DML or data manipulation language, DDL or data definition language, and DCL or data control language.
- (xiv) **DDL Compiler**: DDL Compiler converts data definition statements into a set of tables which contains meta-data (data about the data) concerning the database. It gives rise to a format that can be used by other components of the database.
- (xv) **Data Transformation**: Data transformation cleans and standardizes the data, and loads it into data repository received from the data sources. This is often called "staging" data as data often passes through a temporary database whilst it is being transformed. This activity of transforming data can be performed either by manually created code or a specific type of software could be used called an Extract, Transform and Load (ETL) tool.
- (xvi) **String**: It is a data type consisting of a sequence of contiguous characters that represent the characters themselves rather than their numeric values. A String can

include letters, numbers, spaces, and punctuation. The String data type can store fixed-length strings ranging in length from 0 to approximately 63K characters and dynamic strings ranging in length from 0 to approximately 2 billion characters. The codes for String characters range from 0–255.

- (xvii) **Router** : Router is a kind of connecting device which makes forwarding decisions of data packet on the basis of network addresses. They help administer the data flow by redirecting data traffic to various peripheral devices or other computers. Routers are not only passing on the data as necessary but also select appropriate routes in the event of possible network malfunctions or excessive use. The primary purpose of a router is to examine the source and destination IP addresses of data packets it receives and to direct those packets out the appropriate port and over the best path available at the time. They accomplish this by using routing protocols and routing algorithms.
- (xviii) **Transport Layer**: This is the fourth layer in OSI referencemodel and ensures reliable transfer of data between user processes, assembles and disassembles message packets, provides error recovery and flow control. At this layer, multiplexing and encryption take place.
- (xix) **Network protocol**: are sets of rules for communicating timings, sequencing, formatting, and error checking for data transmission. These protocols provide standards for data communication. A protocol defines the following three aspects of digital communication.
 - **Syntax**: The format of data being exchanged, character set used, type of error correction used, type of encoding scheme (e.g., signal levels) being used.
 - **Semantics**: Type and order of messages used to ensure reliable and error free information transfer.
 - **Timing**: Defines data rate selection and correct timing for various events during data transfer.
- (xx) **Middleware**: The network system implemented within the client/server technology is termed as Middleware. 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. The middleware is typically composed of four layers, which are Service, Back-end Processing, Network Operating System, and Transport Stacks.
- (xxi) **FTP server** : File Transfer Protocol (FTP) is an Internet-wide standard for distribution of files from one computer to another. The computer that stores files and makes them available to others is server. Client software is used to retrieve the files from the server. The two most common ways to transfer files are with anonymous FTP and logged FTP.
- (xxii) **Intrusion Detection System (IDS)** : Intrusion Detection is the art of detecting inappropriate, incorrect, or anomalous activity in network based environment. ID

systems that operate on a host to detect malicious activity on that host are called host-based ID systems, and ID systems that operate on network data flows are called network-based ID systems. The term intrusion is used to describe attacks from the outside; whereas, misuse is used to describe an attack that originates from the internal network.

- (xxiii) **Web Page** : Web page is a text document that contains links to other web pages, graphics and audio files, and other Internet services such as file transfer protocol (FTP) and E-mail. It reside on servers that run special software allow users to access web pages and to activate links to other web pages and to Internet services. A user can directly access any web page on one of these servers and then follow the links to other pages.
- (xxiv) **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, because they are activated when a user clicks on specific text or images within a web page.
- (xxv) **Bluetooth**: Bluetooth is a specification that describes how mobile phones, computers and personal digital assistants (PDA) can be easily interconnected using a short range wireless connections. Using this technology, users of cell phone and PDA can get quickly synchronized with information in desktop or notebook, initiate the sending or receiving of a fax, initiate a print out or in general, have a total coordination between these devices.
- (xxvi) **DSL** : Digital Subscriber Line (DSL) is also called an always on connection because it uses existing 2-wire copper telephone line connected to the premise and will not tie up with phone as a dial-up connection does. There is no need to dial-in to Internet Service Provider (ISP) as Digital Subscriber Line (DSL) is always on. The two main categories of Digital Subscriber Line (DSL) for home subscribers are called Asymmetric Digital Subscriber Line (ADSL) and Symmetric Digital Subscriber Line (SDSL).
- (xxvii) **Site Blocking** : It is a software-based approach that prohibits access to certain web sites that are deemed inappropriate by management. For example, sites that contain explicit objectionable material can be blocked to prevent employee's from accessing these sites from company Internet servers. In addition to blocking sites, companies can also log activities and determine the amount of time spent on the Internet and identify the sites visited.

$$\begin{aligned}
 2. \quad (i) \quad (1101011)_2 &= (\quad)_{10} \\
 &= 1 \times 2^6 + 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 \\
 &= 64 + 32 + 0 + 8 + 0 + 2 + 1 \\
 \text{Thus, } (1101011)_2 &= (107)_{10}
 \end{aligned}$$

$$(ii) \quad (692)_{10} = (\quad)_2$$

		Remainder
2	692	
2	346	0
2	173	0
2	86	1
2	43	0
2	21	1
2	10	1
2	5	0
2	2	1
	1	0

$$\text{Thus, } (692)_{10} = (1010110100)_2$$

$$\begin{aligned}
 (iii) \quad (110011.11)_2 &= (\quad)_{10} \\
 &= 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2} \\
 &= 32 + 16 + 0 + 0 + 2 + 1 + \frac{1}{2} + \frac{1}{4} \\
 &= 51 + \frac{3}{4}
 \end{aligned}$$

$$\text{Thus, } (110011.11)_2 = (51.75)_{10}$$

$$(iv) \quad (346.25)_{10} = (\quad)_2$$

We have to solve the integral and fractional part separately.

Integral part

Remainder		
2	346	
2	173	0
2	86	1
2	43	0
2	21	1
2	10	1
2	5	0
2	2	1
	1	0



$$(346)_{10} = (1\ 0\ 101\ 1\ 0\ 1\ 0)_2$$

Fractional part

0.25	
x 2	
.50	0
.50 x 2	
1.00	1



$$(0.25)_{10} = (01)_2$$

$$\text{Thus, } (346.25)_{10} = (1\ 0\ 1\ 0\ 1\ 1\ 0\ 1\ 0 . 01)_2$$

3. (i) **Multiprogramming** :It is defined as execution of two or more programs that all reside in primary storage. Since CPU can execute only one instruction at a time, it cannot simultaneously execute instructions from two or more programs. However, it can execute instruction from one program then from second program 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 Input/Output devices to complete their job, as Input/Output devices are very slow. When Input / Output devices are working for one program, CPU executes instructions of second program. Thus, multiprogramming is a technique which helps in utilizing a computer system more effectively.

Multi-tasking : It 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. *Single-user operating systems* have traditionally been the most common type of operating system for microcomputers. These only allow the user to work on one task at a time. For microcomputers, multi-tasking operating systems provide single users with multiprogramming capabilities. This is often accomplished through foreground/background processing.

- (ii) **Mainframe Computers:** Mainframes are big general-purpose computers capable of handling all kinds of scientific and business applications. They are used mainly by large organizations for critical applications such as census, industry and consumer statistics, ERP etc. Mainframes can process at several million instructions per second and can support more than 1,000 remote terminals and 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 mainframe computers. They have high-speed cache memory which enables them to process applications at a faster rate than mini or microcomputers. They also offer the facility of multiprogramming and time-sharing. Due to heavy cost in establishing the mainframe system, only big corporates and companies can afford to do so.

Mini Computers: It is a class of multi-user computers that lies in the middle range of the computing spectrum, in between mainframe and micro computer. This type of computer performs data processing activities in the same way as the mainframe but on a smaller scale. They are also known as midrange computers. They had relatively high processing power and storing capacity that mostly fit the needs of midrange computers. They are used in manufacturing processes or handling email of the company. These systems can serve as information processors in small-to-medium sized firms or as processors in computer networks for large firms. Primary storage capacity starts at about 640 KB and can go as high as few megabytes (MB). A minicomputer system consists of a CPU, several disk drives, a high-speed printer, perhaps a few magnetic tape units, and number of terminals.

- (iii) **First Generation Language or Machine Language :** Machine language programs were written in machine codes. Each particular computer model has a machine language, which is based on the internal engineering architecture of the equipment, and which is developed and provided to user by the computer manufacturer. A machine level language is the language of the computer, the only language the computer understands without translation. If such a language is used in writing a program (say a user's payroll program), the programmer must be familiar with the specific machine-level language as well as with the details of the computer equipment to be used. Programs written in machine-level language can only be used on the computer model for which that language is written. That is why this language is called machine-oriented. Writing programs in machine language is not

only difficult for humans to do but is also subject to error. The earlier machine language employed the binary code *i.e.*, the instructions were codified in series of 1's and 0's in accordance with the bit pattern of the instruction to be performed.

Second Generation Language or Assembler Language : Assembly Languages are at the next level in improvement over the machine languages. They are also known as symbolic languages because they employ symbols for both arithmetic and logical operations and even location addresses. Such standard symbols for the various operations are supplied by the computer manufacturer who creates the assembly language for his computer. Since mnemonic symbols are being used, this eases up the programmer's task greatly. But the computer follows its machine language only and the program written in the assembler language has to be translated. This is accomplished by a special program usually supplied by the computer manufacturer and known as the *assembler*. The assembler simply translates each instruction in symbolic language to its machine language equivalent. Thus, there is a one-for-one correspondence between the two languages.

- (iv) **Windows Vista :** It contains a number of new features, from a redesigned shell and user interface to significant technical changes, with a particular focus on security features. It has updated graphical user interface and visual style dubbed Aero, a redesigned search function, multimedia tools including Windows DVD Maker, and redesigned networking, audio, print, and display sub-systems. Vista aims to increase the level of communication between machines on a home network, using peer-to-peer technology to simplify sharing files and media between computers and devices. Windows Vista includes version 3.0 of the .NET Framework, allowing software developers to write applications without traditional Windows APIs. It is available in a number of different editions, and has been subject to some criticism.

Windows 7.0 : It is the latest release of Microsoft Windows, a series of operating systems produced by Microsoft for use on personal computers, including home and business desktops, laptops, notebook, tablet PCs, and media center PCs. Windows 7 was released for general retail availability less than three years after the release of its predecessor, Windows Vista. Unlike its predecessor, Windows Vista, which introduced a large number of new features, Windows 7 was intended to be a more focused, incremental upgrade to the Windows line, with the goal of being compatible with applications and hardware which Windows Vista wasn't at the time. Presentations given by Microsoft in 2008 focused on multi-touch support, a redesigned Windows shell with a new taskbar, referred to as the Superbar, a home networking system called HomeGroup, and performance improvements. Some standard applications that have been included with prior releases of Microsoft Windows, including Windows Calendar, Windows Mail, Windows Movie Maker, and Windows Photo Gallery, are not included in Windows 7; most are instead offered separately at no charge as part of the Windows Live Essentials suite.

- (v) **Hierarchical Database Structure:** In a hierarchical database structure, records are logically organized 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. There can be many levels of node records in a database. Hierarchical database structure is less flexible because the hierarchy of records is to be determined beforehand. Also use of query language to solve the problem may prove to be very time consuming.

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. Thus, the network model implements the one-to-one and the one-to-many record structures. However, unlike the hierarchical model, the network model also permits a record to be a member of more than one set at one time. This feature allows the network model to implement the many-to-one and the many-to-many relationship types. Network data structures can be entered and traversed more flexibly. 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. Record relationships are usually structured to fit the processing needs of large batch reports. However, adhoc requests for data, requiring record relationships not established in the data model, may not be very swift at all, and in some cases, they may not be possible.

- (vi) **Primary Key:** The primary key of a table is any candidate key of that table which the database designer arbitrarily designates as primary. The primary key may be selected for convenience, comprehension, performance, or any other reasons. It is entirely proper to change the selection of primary key to another candidate key.

Secondary Key: Secondary keys can be defined for each table to optimize the data access. They can refer to any column combination and help to prevent sequential scans over the table. A candidate key which is not selected as a primary key is known as Secondary Key.

- (vii) **Online Backup :** An online database backup is performed by executing the command-line or from the 'Backup Database' utility. When an online backup process begins the database engine externalizes all cached data pages kept in memory to the database file(s) on disk. This process is called a checkpoint. The database engine continues recording activity in the transaction log file while the database is being backed up. The log file is backed up after the backup utility finishes backing up the database. The log file contains all of the transactions recorded since the last database backup.

Live Backup: A live backup is carried out by using the BACKUP utility with the

command-line option and provides a redundant copy of the transaction log for restart of the system on a secondary machine in the event the primary database server machine becomes unusable.

(viii) External Database view :

- It is at the highest level of the database abstraction.
- It includes only those portions of database or application programs which are of concern to the users.
- It is described by means of a scheme, called the external schema.
- It is defined by the users or written by the programmers.

Internal Database view :

- It is at the lowest level of database abstraction.
- It is closest to the physical storage method.
- It indicates how data will be stored.
- It describes data structure and data access methods.
- It is expressed by internal schema.

- (ix) Information Warehouse Databases:** An information warehouse stores data from current and previous years. This is usually data that has been extracted from the various operational and management databases of an organization. It is a central source of data that has been standardized and integrated so that it can be used by managers and other end-user professionals throughout an organization. An important use of information warehouse databases is pattern processing, where operational data is processed to identify key factors and trends in historical patterns of the business activity.

Text Databases: Text databases are natural outgrowth of the use of computers to create and store documents electronically. Thus, online database services store bibliographic information such as publications in larger text databases. Text databases are also available on CD-ROM optical disks for use with microcomputer systems. Big corporations and government agencies have developed large text databases containing documents of all kinds. They use text database management systems software to help create, store, search, retrieve, modify, and assemble documents and other information stored as text data in such databases.

(x) Asynchronous Transmission and Synchronous Transmission :

ASYNCHRONOUS TRANSMISSION

- Each data word is accompanied by start and stop bits.
- Extra Start and Stop bits slow down the transmission process relatively.

- It is relatively cheaper.
- More reliable as the start and stop bits ensure that the sender and the receiver remain in step with one another.
- It is less efficient.

SYNCHRONOUS TRANSMISSION

- Allows characters to be sent down the line without start-stop bits.
- Transmission is faster as in absence of start and stop bits, many data words can be transmitted per second.
- The synchronous device is more expensive to build as it must be smart enough to differentiate between the actual data and the special synchronous characters.
- Chances of data loss are relatively higher.
- It is more efficient.

(xi) Client-server model and Peer-to-Peer model

Client-server model

- In this model, number of computers, known as clients are connected to a single host computer known as server.
- It uses a dedicated server which provides various services to clients like hardware, software and data access.
- Clients can share disk storage and printers attached with the server.
- It is suitable for large organizations having large number of nodes.
- Data transfer speed is more.
- Failure of server results in break-down of entire network.
- Server cannot be used for data entry/result purposes, hence it can be said that all the computers are not fully employed.
- Clients are required to be connected with server in a particular structure like Star Network.
- Clients can be dumb terminal or Intelligent terminals.
- This architecture is employed where data security is of prime importance.

Peer-to-Peer model

- 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.
- It uses non-dedicated server. Non-dedicated server can also be used as a node for data entry, processing and output operations.

- All computers can share the data/resources of each other.
- It is suitable in small organisations having less number of nodes upto ten.
- Data transfer speed is less which decreases even further with the increase in number of computers.
- 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.
- All the computers are fully employed.
- Computers can be connected at any convenient point in the network like Ring Network.
- All computers are intelligent terminals.
- This architecture is used when security is not a bigger issue.

(xii) **Bus network:** This structure is very popular for local area networks. In this structure or topology, a single network cable runs in the building or campus and all nodes are linked along with this communication line with two endpoints called the bus or backbone. Two ends of the cable are terminated with terminators. The bus topology is reliable, easy to extend and requires least amount of cable to connect the computer together and therefore is less expensive than other cabling arrangements.

Mesh network: In this structure, there is random connection of nodes using communication links. A mesh network may be fully connected or connected with only partial links. In fully interconnected topology, each node is connected by a dedicated point to point link to every node. In partially connected mesh topology, computer nodes are widely scattered. In this topology, it yields the greatest amount of redundancy in the event that one of the nodes fails where network traffic can be redirected to another node. Also it is easier to diagnose network problems.

(xiii) **Single Tier system architecture:** It consists of a single computer that contains a *database* and a *front end* to access the database. There is one computer which stores all of the company's data on a single database. The interface used to interact with the database may be part of the database or another program which ties into the database itself. A single-tier system requires only one stand-alone computer. It also requires only one installation of proprietary software which makes it the most cost-effective system available.

Two tier system architecture : A two-tier system consists of a client and a server. The database is stored on the server, and the interface used to access the database is installed on the client. The user system interface is usually located in the user's desktop environment and the database management services are usually in a server that is more powerful machine that services many clients. Processing management is split between the user system interface environment and the database management server environment that provides stored procedures and

triggers. Two-tier architecture is intended to improve usability by supporting a forms-based, user-friendly interface. It improves scalability by accommodating upto approx 100 users and improves flexibility by allowing data to be shared, usually within a heterogeneous environment.

- (xvi) **Strategic SCM:** It performs strategic network optimization, including the number, location, and size of warehouses, distribution centers and facilities. It provides strategic partnership with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third-party logistics. Product design coordination is developed so that new and existing products can be optimally integrated into the supply chain. Strategic SCM provides the information technology infrastructure, to support supply chain operations. It also supports in making the buying decisions.

Tactical SCM: It gives sourcing contracts and makes other purchasing decisions like Production decisions, including contracting, locations, scheduling, and planning process definition, Inventory decisions, including quantity, location, and quality of inventory. It also supports transportation strategy, including frequency, routes, and contracting, benchmarking of all operations against competitors and implementation of best practices throughout the enterprise and milestone payments to its users.

- (xv) **Flowchart :** It is a simple list of the steps that comprise an algorithm which is sufficient for stating the problem in a clear and unambiguous manner. A flowchart is a diagram, prepared by the programmer, of the sequence of steps, involved in solving a problem. It is like a blueprint, in that it shows the general plan, architecture, and essential details of the proposed structure. It is an essential tool for programming and it illustrates the strategy and thread of logic followed in the program. 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.

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. Decision tables are necessitated by the fact that branches of the flowchart multiply at each diamond (comparison symbol) and may easily run into scores and even hundreds. If, therefore, the programmer attempts to draw a flowchart directly, he is liable to miss some of the branches.

4. (a) The CPU has at least two most important parts, namely, the control unit and the arithmetic logic unit. These components are discussed below.
 - (i) **Control Unit:** The control unit is one of the most important components of the CPU that implements the microprocessor instruction set. It extracts instructions

from memory and decodes and executes them, and sends the necessary signals to the ALU to perform the operation needed. All the computer's resources are managed from the control unit. The CPU's instructions for carrying out commands are built into the control unit. The instructions, or instruction set, list all the operations that the CPU can perform. Each instruction in the instruction set is expressed in microcode- a series of basic directions that tell the CPU how to execute more complex operations. Before a program can be executed, every command in it must be broken down into instructions that correspond to the ones in the CPU's instruction set. When the program is executed, the CPU carries out the instructions, in order, by converting them into microcode. Although the process is complex, the computer can accomplish it at an incredible speed, translating millions of instructions every second.

- (ii) **Arithmetic Logic Unit :** The actual processing of the data and instruction are performed by Arithmetic Logical Unit. The major operations performed by the ALU are addition, subtraction, multiplication, division, logic and comparison. Data is transferred to ALU from storage unit when required. After processing, the output is returned back to storage unit for further processing or getting stored. Because computers store all the data in the form of numbers, a lot of the processing that takes place involves comparing numbers or carrying out mathematical operations.

In addition to establishing ordered sequences and changing those sequences, the computer operations can be divided into two types: arithmetic operations and logical operations. Arithmetic operations include addition, subtraction, multiplication, and division. Logical operations include comparisons, such as determining whether one number is equal to, greater than, or less than another number. Also, every logical operation has an opposite operation. For example, in addition to "equal to" there is "not equal to". The ALU includes a group of registers having high-speed memory locations built directly into the CPU that are used to hold the data currently being processed.

- (b) Ports and connectors are components of the motherboard that let the user connect external devices like printers, keyboards or scanners and let them interface with the PC. The physical interfaces for the ports and connectors are located on the outside—typically at the back of the PC, but they are directly or indirectly (using a connector card) connected to the motherboard.

There are various types of ports or connectors, each providing different data transfer speed to connect various external peripherals.

- (i) **Parallel port:** A parallel port is a parallel communication physical interface. Parallel ports facilitate the parallel transmission of data, usually one byte (8 bits) at a time. It is also known as a printer port or Centronics port. The IEEE

1284 standard defines the bi-directional version of the port, which allows the transmission and reception of data bits at the same time. Parallel ports are used to connect external input/output devices like scanners or printers.

- (ii) **Com/Serial port:** A serial port is a serial communication physical interface through which information transfers in or out one bit at a time. They are used for connecting communication devices like modems or other serial devices like mice. There are two varieties of COM ports— the 9-pin port and 25-pin port. Serial port uses 25 pin RS-232 port.
 - (iii) **IDE drive connector:** IDE devices like CD-ROM drives or hard disk drives are connected to the motherboard through the IDE connector.
 - (iv) **Floppy drive connector:** The floppy drive connectors are used for connecting the floppy drive to the motherboard, to facilitate data exchange.
 - (v) **USB connector:** USB stands for Universal Serial Bus. These ports provide the user with higher data transfer speed for different USB devices like keyboard, mice, scanner and digital camera.
 - (vi) **PS/2 connector:** PS/2 stands for Personal System/2. PS/2 connectors are used to connect PS/2 based input devices like PS/2 keyboards or mice.
5. (a) The division to primary, secondary, tertiary and off-line storage is based on memory hierarchy, or distance from the central processing unit. There are also other ways to characterize various types of storage which are discussed below.
- (i) **Volatility of information**
 - Volatile memory requires constant power to maintain the stored information. Volatile memory is typically used only for primary storage.
 - Non-volatile memory will retain the stored information even if it is not constantly supplied with electric power. It is suitable for long-term storage of information, and therefore used for secondary, tertiary, and off-line storage.
 - (ii) **Differentiation of information**
 - Dynamic memory is volatile memory which also requires that stored information is periodically refreshed, or read and written without modification.
 - Static memory is a form of volatile memory similar to DRAM with the exception that it never needs to be refreshed as long as power is applied. (It loses its content if power is removed).
 - (iii) **Ability to access non-contiguous information**
 - Random access means that any location in storage can be accessed at any moment in the same, usually small amount of time.

This makes random access memory well suited for primary storage.

- **Sequential access** means that the accessing a piece of information will take a varying amount of time, depending on which piece of information was accessed last. The device may need to *seek* (e.g. to position the read/write head correctly), or *cycle* (e.g. to wait for the correct location in a constantly revolving medium to appear below the read/write head) the required information at given point of time.

(iv) **Ability to change information**

- **Read/write storage** or **mutable storage**, allows information to be overwritten at any time. A computer without some amount of read/write storage for primary storage purposes would be useless for many tasks. Modern computers typically use read/write storage, which is also used for secondary storage.
- **Read only storage (ROM)** retains the information stored at the time of manufacture, and **write once storage (WORM)** allows the information to be written only once at some point after manufacturing. These are called **immutable storage**. Immutable storage is used for tertiary and off-line storage. Examples include CD-R.
- **Slow write, fast read storage** is read/write storage which allows information to be overwritten multiple times, but with the write operation being much slower than the read operation. Examples include CD-RW.

(v) **Addressability of information**

- In **location-addressable storage**, each individually accessible unit of information in storage is selected with its numerical memory address. In modern computers, location-addressable storage usually limits to primary storage, accessed internally by computer programs, since location-addressability is very efficient, but burdensome for humans.
- In **file system storage**, information is divided into *files* of variable length, and a particular file is selected with human-readable directory and file names. The underlying device is still location-addressable, but the operating system of a computer provides the file system abstraction to make the operation more understandable. In modern computers, secondary, tertiary and off-line storage use file systems.
- In **content-addressable storage**, each individually accessible unit of information is selected with a hash value, or a short identifier with number pertaining to the memory address the information is stored

on. Content-addressable storage can be implemented using software (computer program) or hardware (computer device), with hardware being faster but more expensive option.

(vi) Capacity and performance

- **Storage capacity** is the total amount of stored information that a storage device or medium can hold. It is expressed as a quantity of bits or bytes. For example 10.4 megabytes data.
- **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. For example 1.2 megabytes data per square centimeter.
- **Latency** is the time it takes to access a particular location in storage. The latency is typically nanoseconds for primary storage, milliseconds for secondary storage, and seconds for tertiary storage. It may make sense to separate *read latency* and *write latency*, and in case of sequential access storage, *minimum*, *maximum* and *average latency*.
- **Throughput** is the rate at which information can read from or written to the storage. In computer storage, throughput is usually expressed in terms of *megabytes per second* or *MB/s*, though bit rate may also be used. As with latency, *read rate* and *write rate* may need to be differentiated.

(b) The storage capacity of a magnetic disk depends upon the following factors.

- (i) **Number of sides of the diskette used:** Earlier disks and drives were designed so that data could be recorded only on one side of the diskette. Now a days disk drives are manufactured so that data can be read/written on both sides of the diskette. Such drives are called 'Double Sided Drives'. The use of double sided drives and diskette approximately doubles the number of characters that can be stored on the diskette.
 - (ii) **The recording density of the bits in the track:** Recording density refers to the number of bits that can be recorded on a disk in one inch circumference of the innermost track on the diskette. This measurement is referred to as bits per inch (bpi). For the user, the diskette is identified as being either single density or double density. A single and double density drive can store 2768 bits and 5876 bits per inch respectively.
 - (iii) **The number of tracks on the diskette:** Number of tracks depends upon the drive being used. Many drives record 40 tracks on the surface of the diskette. Other drives, however, can record 80 tracks on the diskette.
6. An optical laser disk is a storage medium from which data is read and to which it is written by lasers. Optical disks can store much more data, than the most portable magnetic media, such as floppies or pen drive.

There are four basic types of optical disks as discussed below.

- (i) **CD-ROM:** It is a spinoff of audio CD technology and stands for compact disk-read only memory. Once inserted into the CD-ROM disk drive, the text, video images, and so on can be read into primary storage for processing or display. However, the data on the disk are fixed, they cannot be altered. The capacity of a single CD-ROM is over 650 MB which is equivalent to 250,000 pages of text, or 1500 floppy disks. The tremendous storage capacity has opened the door to a variety of multimedia applications. Unlike a video tape, CD-ROM gives the presenter instant random access to any sequence of images on the disk. There are three basic types of optical disks:

CD-ROM :It stands for compact disc-read only memory.

CD RW: It stands for compact disc rewriteable.

CD-R : It stands for compact disc recordable.

- (ii) **WORM Disk:** It refers to Write Once, Read Many optical laser disks, or WORM disks. Once the data has been written to the medium, they only can be read, not updated or changed. When data is written to a WORM drive, physical marks are made on the media surface by a low-powered laser and since these marks are permanent, they cannot be erased. Companies generally store their proprietary information in WORM disk. These are 3½ inch diskette of 200 MB capacity onwards.

- (iii) **Magneto-Optical Disks:** Magneto-optical disk integrates optical and magnetic disk technology to enable read-write storage. MO diskette can store many times that amount, ranging from 100 MB upto several gigabytes (GB). MO discs come in 3.5" and 5.25" cartridges. The capacities of 3.5" cartridges are 128 MB, 230 MB, 640 MB, 1.3 GB and 5.25" cartridges are 650 MB, 1.3 GB, 2.6 GB, 5.2 GB, and 9.1 GB.

A MO system achieves its high data density by using a laser and a magnetic read/write head in combination. Both the laser and the magnet are used to write data onto the diskette. The laser heats up the diskette surface so it can be easily magnetized, and also to allow the region of magnetization to be precisely located and confined. A less intense laser issued to read data from the diskette. Data can be erased and/or overwritten an unlimited number of times, as with a conventional 3.5-inch diskette.

- (iv) **Digital Video Disk:** DVD (also known as "Digital Versatile Disc" or "Digital Video Disc") is an optical disc storage media format that can be used for data storage, including movies with high video and sound quality. A video disk can store text, video, and audio data. Video disks can be accessed a frame at a time (to provide still information) or played like a phonograph record (to supply upto an hour of moving action). Any of the 54,000 tracks on the surface

of typical video disk can be accessed in about three seconds. DVD can store 4.7 gigabyte of data on a single-side and 17 gigabytes of data on a double-side of the disc. This compares to 650 megabytes (.65 gigabyte) of storage for a CD-ROM disk.

A digital video disk (DVD) is a 5 inch plastic disk that uses a laser to encode microscopic pits in its substrate surface. But the pits on a DVD are much smaller and are encoded much closer together than those on a CD-ROM. DVD-5, 9, 10 and 18 are the various types of DVDs can be used for storing images, text, movies, high resolution graphics etc. The advantages of DVDs are therefore self-evident – a huge storage capacity that enables users to archive large amounts of data on a single, lightweight, removable, reliable, easily-transportable medium. Video disks are widely used for training applications.

- (v) **Blu Ray Disc:** It is the next generation optical disc format developed to enable recording, rewriting and playback of High Definition video (HD), as well as storing large amount of data. The format offers more than five times the storage capacity of traditional DVDs and can hold up to 25 GB on a single-layer disc and 50 GB on a dual-layer disc. This extra capacity combined with the use of advanced video and audio codes that will offer consumers an unprecedented HD experience. While current optical disc technologies such as DVD, DVD±R, DVD±RW, and DVD-RAM rely on a red laser to read and write data, the new format uses a blue-violet laser instead, hence the name Blu-ray. The benefit of using a blue-violet laser is that it has a shorter wavelength (405nm) than a red laser (650nm), which makes it possible to focus the laser spot with even greater precision. This allows data to be packed more tightly and stored in less space, so it's possible to fit more data on the disc even though it's the same size as a CD/DVD.

Optical laser disk storing technique : Optical laser disk storage is capable of storing vast amount of data. With this technology, the read/write head used in magnetic storage is replaced by two lasers. One laser beam writes to the recording surface by scoring macroscopic pits in the disk, and another laser reads the data from the light sensitive recording surface. A light beam is easily deflected to the desired place on the optical disk, so a mechanical access arm is not needed.

- 7. (a) A computer terminal is an electronic or electromechanical hardware device that is used for entering data into, and displaying data from, a computer or a computing system. Typically, it provides a text terminal interface over a serial line. A computer terminal or video display terminal (VDT), generally combines input and output functions. It consists of a QWERTY keyboard for inputting information direct to the computer, and either a printer or a TV screen for displaying information from the computer. Terminals are most commonly found in area that is remote from the main computer and they interact with the computer through communication lines or networks.

Various types of terminals are discussed below.

- (i) **Dumb Terminal:** It is an input/output (I/O) device that provides for data entry and information exit when connected to a computer but has no additional capability.
 - (ii) **Intelligent Terminal:** It has an in-built processing capability. It is also user-programmable. 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. The cost of intelligent terminals are several times more than non-intelligent terminals. They also provide a type of backup to the main computer because the terminal can handle some of the processing.
 - (iii) **Smart Terminal:** It additionally, contains a microprocessor and some internal storage. They have data editing capability and can consolidate input data before sending it to CPU. These terminals are non-programmable by users.
 - (iv) **Remote Job Terminal:** Also referred to as Remote Job Entry or RJE, groups the data into blocks for transmission to a computer from a remote site. RJE terminals have the capability of receiving data back and printing the results of the application program. Such a unit is in itself a small computer, which can be used either as job entry terminal or as a stand-alone computer.
 - (v) **Hard-wired Terminal:** These terminals are linked to the computer system by a direct cable. However, for remote terminals, communication to the main system can be established via telecommunication lines such as ordinary telephone lines.
 - (vi) **Keyboard Printer Terminal:** The keyboard printer terminal or *teletypewriter* consists of a keyboard for sending information to the computer and a printer, for providing a copy of the input and receiving information from the computer.
- (b) Various methods of producing computer output are discussed below.
- (i) **Monitors :** It is also called as video display terminal (VDT). The visual display of the processed data, which the users can view, is got through the monitor. Computer monitors come in a variety of screen sizes and are two types, namely CRT and Flat panel. CRT stands for *cathode ray tube*, describing the technology inside an analog computer monitor or television set. The CRT monitor creates a picture out of many rows or lines of tiny colored dots. These are technically not the same thing as pixels, but the terms are often used interchangeably. The more lines of dots per inch, the higher and clearer the resolution. Higher resolutions are important for displaying the subtle detail of

graphics. The *refresh rate* indicates how many times per second the screen is repainted. Though, monitors differ in their capabilities, lower resolutions normally have higher refresh rates because it takes less time to paint a lower resolution. Generally speaking, high-end monitors have higher refresh rates overall than lower-end models.

- (ii) **Printers** :These are one of the most common output devices. It provides the user with a permanent visual record of the data output from the computer. The output printed on the paper is called hard copy. The hard copy is also called as print out. Printers can print on ordinary paper or on specially prepared forms such as dispatch notes, invoices or packing slips. Printers have been developed that are capable of printing from 150 to 2,500 lines per minute, each line consisting of as many as 150 characters. Printers can broadly be subdivided into two categories: impact and non-impact printers. The former are the most common type of printer.
- (iii) **Computer Output Microfilm (Microfiche)** :It is an output technique that records output from a computer as microscopic images on roll or sheet film. The images stored on COM are the same images, which would be printed on paper. It reduces characters 24, 42, or 48 times smaller than normal size. The information is then recorded on 16 mm, 35 mm or 105 mm Microfilm. The data to be recorded is displayed on CRT and a camera takes a picture of it and places it on the film. The film is then processed either in the recorder unit or separately. After it is processed, it can be retrieved and viewed by the user.
- (iv) **Speakers** :The speakers attached to these systems are similar to ones that are connected to a stereo. The only difference is that they are usually smaller and they contain their own small amplifiers. Otherwise, they do the same thing that any speaker does. They transfer a constantly changing electric current to a magnet, which pushes the speaker cone back and forth. The moving speaker cone creates pressure vibrations, in other words, sound. The more complicated part of the sound output system is in the **sound card**. The sound card translates digital sound into the electric current that is sent to the speaker. To digitize sound, the waves are converted to an electric current measured thousands of times per second and recorded as a number. When the sound is played back, the sound card reverses this process, translating the series of numbers into electric current that is sent to the speaker. The magnet moves back and forth with the changing current, creating vibrations.
- (v) **Graph Plotter** :A graph plotter is a device capable of tracing out graphs, designs and maps into paper and even into plastic or metal plates. A high degree of accuracy can be achieved, even up to one thousandth of an inch. Plotters may be driven on-line or off-line. Computer systems dedicated to design work often operate plotter on-line but systems used for other applications as well as graphic applications operate them off-line. There are

two types of plotters, drum and flat-bed. Plotters are now increasingly being used in application like CAD, which requires high quality graphics on paper. A plotter can be connected to a PC through the parallel port. A plotter is more software dependent than any other peripheral, and needs much more instructions than the printer for producing output.

8. (a) Advantage and disadvantages of 1st generation of computer language (machine language) are discussed below.

Advantages

The only advantage is that program made of machine language run very fast because no translation program is required for the CPU.

Disadvantages

- (i) It is very difficult to do programming in machine language. The programmer has to know details of hardware to write program.
- (ii) The programmer has to remember a lot of codes to write a program which results in program errors.
- (iii) It is difficult to debug the program.

Advantages and disadvantages of 2nd generation of computer language (assembly language) are discussed below.

Advantages:

- (i) The symbolic programming of assembly language is easier to understand and saves a lot of time and effort of the programmer.
- (ii) It is easier to correct errors and modify program instructions.
- (iii) Assembly language has the same efficiency of execution as the machine level language. Because this is one-to-one translator between assembly language program and its corresponding machine language program.

Disadvantages:

- (i) One of the major disadvantages is that assembly language is machine dependent. A program written for one computer might not run in other computers with different hardware configuration
- (ii) An assembly language programmer will normally have to write a large number of statements to solve a given problem than will a programmer using other high-level programming languages.
- (iii) Because of the concise symbolic notation used in assembly language, assembly language programs are often more difficult to write, read and maintain than programs written in high-level languages.
- (iv) Assembly languages are not normally used to write programs for generalized

business application software such as payroll, account receivable, billing, and similar applications. Other languages are available that are more appropriate for programming these types of applications.

9. (a) An expert system (ES) 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, specific subject areas. Various components of an expert system are discussed below:
- (i) **Knowledge base:** This includes the data, knowledge, relationships, rules of thumb (heuristics), and decision rules used by experts to solve a particular type of problem. A knowledge base is the computer equivalent of all the knowledge and insight that an expert or a group of experts develop through years of experience in their field.
 - (ii) **Inference engine:** This program contains the logic and reasoning mechanisms that simulate the expert logic process and deliver advice. It uses data obtained from both the knowledge base and the user to make associations and inferences, form its conclusions, and recommend a course of action.
 - (iii) **User interface:** This program allows the user to design, create, update, use, and communicate with the expert system.
 - (iv) **Explanation facility:** This facility provides the user with an explanation of the logic the expert system used to arrive at its conclusion.
 - (v) **Knowledge acquisition facility:** Building a knowledge base, referred to as knowledge engineering, involves both a human expert and a knowledge engineer. The knowledge engineer is responsible for extracting an individual's expertise and using the knowledge acquisition facility to enter it into the knowledge base.
- (b) Advantages offered by expert systems are discussed below.
- (i) They provide a cost effective alternative to human experts.
 - (ii) They can outperform a single expert because their knowledge is representative of numerous experts. They are faster and more consistent and do not get distracted, overworked or stressed out.
 - (iii) They produce better quality and more consistent decisions. Expert systems assist users in identifying potential decision making problems, which increases the probability that sound decisions will be made.
 - (iv) They can increase productivity.
 - (v) They preserve the expertise of an expert leaving the organization.

Disadvantages offered by expert systems are discussed below.

- (i) Development can be costly and time-consuming. Some large systems required upto 15 years and millions of dollars to develop.
- (ii) It can be difficult to obtain knowledge from experts who have difficulty specifying exactly how they make decisions.
- (iii) Designers have not been able to program what humans consider common sense into current systems. Consequently, rule-based systems break down when presented with situations they are not programmed to handle.
- (iv) Until recently, developers encountered skepticism from businesses due to the poor quality of the early expert systems and the high expectations of users.

10. (a) Advantages and disadvantages of the sequential file organization are discussed below.

Advantages

- (i) Easy to organize, maintain, and understand.
- (ii) There is no overhead in address generation. Locating a particular record requires only the specification of the key field.
- (iii) Relatively inexpensive I/O media and can be used for the storage and processing of such files.
- (iv) It is the most efficient and economical file organization in case of applications in which there are a large number of file records to be updated at regularly scheduled intervals when the activity ratio (the ratio of the total number of records in transaction file and the total number of records in master file) is very high. Applications such as payroll processing, billing and statement preparation, and bank cheque processing meet these conditions.

Disadvantages

- (i) It proves to be very inefficient and uneconomical for applications in which the activity ratio is very low.
- (ii) Since an entire sequential file may need to be read just to retrieve and update few records, accumulation of transactions into batches is required before processing them.
- (iii) Transactions must be sorted and placed in sequence prior to processing.
- (iv) Timeliness of data in the file deteriorates while batches are being accumulated.
- (v) Data redundancy is typically high since the same data may be stored in several files sequenced on different keys.

- (b) **Indexed Sequential File Organisation:** The indexed sequential file organisation or indexed sequential access method (ISAM), is a hybrid between sequential and direct access file organisations. The records within the file are stored sequentially but direct access to individual record is possible through an index. The records are organized in sequence for efficient processing of large batch jobs and an index is used to speed up access to the records. Indexing permit access to selected records without searching the entire file. This index is analogous to a card catalog in a library.

To locate a record, the cylinder index is searched to find the cylinder address, and then the track index for the cylinder is searched to locate the track address of the desired record. Following are the features of Index sequential file organization:

- (i) It permits the efficient and economical use of sequential processing technique when the activity ratio is high.
- (ii) It allows direct access of records in a relatively efficient way when the activity ratio is low.
- (iii) Access to the records is slower than direct file method.
- (iv) Relatively expensive hardware and software may be required.
- (v) Less efficient in the use of storage space than other alternatives.

11. (a) The primary components of the data warehouses are discussed below:

- (i) **Data Source Layer:** Data sources refer to any electronic repository of information that contains data of interest for management use or analytics. This definition covers mainframe databases, client-server databases, PC databases, spreadsheets and any other electronic store of data. Data needs to be passed from these systems to the data warehouse either on a transaction-by-transaction basis for real-time data warehouses or on a regular cycle for offline data warehouses.
- (ii) **Data Transformation Layer:** The Data Transformation layer receives data from the data sources, cleans and standardizes it, and loads it into the data repository, also called staging data as data often passes through a temporary database whilst it is being transformed. Some of the activities that occur during data transformation are - Comparing data from different systems to improve data quality, Standardizing data and codes, Integrating data from different systems and Performing other system housekeeping functions.
- (iii) **Data Warehouse Layer:** The Data Warehouse is a relational database organized to hold information in a structure that best supports reporting and analysis.
- (iv) **Reporting Layer:** The data in the data warehouse must be available to the organization's staff if the data warehouse is to be made useful. There are a

very large number of software applications that perform this function, or reporting can be custom-developed. Examples of types of reporting tools include Business Intelligence tools, Executive Information Systems, Online Analytical Processing (OLAP) Tools and Data Mining.

- (v) **Meta-data Layer:** Meta-data, 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 meta-data include the most recent data load date, the business meaning of a data item and the number of users that are logged in currently.
- (vi) **Operations Layer:** Data warehouse operations comprises of the processes of loading, manipulating and extracting data from the data warehouse. Operations also cover user management, security, capacity management and related functions.

The following components also exist in some data warehouses:

- Dependent Data Marts;
- Logical Data Marts;
- Operational Data Stores.

(b) Stages in Data Mining are discussed below.

- (i) **Selection:** Selecting or segmenting the data according to some criteria so that subsets of the data can be determined. For example, all those people who own a car can be determine for selection.
- (ii) **Pre-processing:** This is the data cleansing stage where certain information is removed which is deemed unnecessary and may slow down queries. Also the data is re-configured to ensure a consistent format as there is a possibility of inconsistent formats because the data is drawn from several sources. For example, gender may be recorded as F or M and also as 1 or 0.
- (iii) **Transformation:** The data is not merely transferred across but transformed in that overlays may be added. For example, demographic overlays are commonly used in market research. The data is made usable and navigable.
- (iv) **Data Mining:** This stage is concerned with the extraction of patterns from the data. A pattern can be defined as a given set of facts (data) F , a language L and some measures of certainty C . A pattern in a statement S in L that describe relationships among a subset F_s of F with a certainty C such that S is simpler in some sense than the enumeration of all the facts in F_s .
- (v) **Integration and evaluation:** The patterns identified by the systems are interpreted into knowledge which can then be used to support human

decision making. For example, prediction and classification tasks, summarizing the contents of a data base or explaining observed phenomena.

12. (a) Features of Program Library Management System Software are discussed below.

- (i) It provides several functional capabilities to effectively and efficiently manage data center software inventory which includes – Application program code, System software code and Job control statements.
- (ii) It possesses integrity capabilities such that each source program is assigned a modification number, a version number and creation date.
- (iii) It uses Password, Encryption, Data compression and Automatic backup.
- (iv) It possesses update capabilities with the facilities of Addition, Modification, Deletion and Re-sequencing library numbers.
- (v) It possesses reporting capabilities for being reviewed by the management and the end users by preparing lists of Additions, Deletions, Modifications, Library catalogue, Library members attributes.
- (vi) It possesses interface capabilities with the Operating System, Job scheduling system, Access control system, Online program management.
- (vii) It controls movement of program from test to production status.
- (viii) At last, it changes controls to application programs.

(b) Various elements which have to be 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.

- (i) Identifying system users and classifying them into homogeneous groups;

- (ii) The user group characteristics are understood like whether the system will be handled by novices or experts;
- (iii) Eliciting the tasks which the users wish to perform using the system;
- (iv) 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.

13. (a) Five commonly used Communication Interface Devices are discussed below.

- (i) **Network Interface Card (NIC):** It is an electronic card which is installed in server as well as in all the nodes for interconnection of nodes with server. Network Interface card provides a connector on its back for connection of nodes and server using network cable. NIC has buffer for storing incoming and outgoing packets, thus improving the network throughput. NIC uses Linear bus topology, according to which only one node can access the data from the server at a time. NIC is installed in one of the available PCI/ISA slot on the motherboard.
- (ii) **Modem (Modulator/Demodulator):** It is an electronic device which is used to convert digital signals to analog telephone signals (modulation) and analog signals to digital data (demodulation) in a data communication system. Modem allows the communication *among* computers through telephone lines. Modems can be categorized on the basis of speed, price and other features. But, most commonly people classify them as internal or external. Internal modem looks like the sound cards and video cards that fit inside the computer. External modem connects to the serial port of the computer. Speed of modem can be 28.8 Kbps (Kilo bits per second) or 56.6 Kbps. Modem installed in Laptop computers is similar to credit card size, known as PCMCIA (Personal Computer Memory Card International Association) modem.
- (iii) **Multiplexer (MUX):** It is an electronic device which allows number of devices to share a single communication line. Multiplexer continuously scans the nodes and server to find out whether any of them wants to send data to other nodes or not. Multiplexer may perform Time division multiplexing (TOM) or Frequency division multiplexing (FOM).
- (iv) **Front-end communication processor:** In case of high volume data transfer, a separate computer, known as front-end communication processor is used for sending and receiving data, code conversions, editing and verification of data, terminal recognition and control of transmission lines thus relieving the main computer for data processing tasks rather than data transmission.
- (v) **Protocol Converter:** Protocols are the standard sets of rules which govern

the flow of data on a communication network. Dissimilar devices, which follow different protocols, cannot communicate with each other without protocol conversion. For example, one computer representing data in ASCII code cannot communicate with another computer using EBCDIC code for data representation without protocol conversion. Protocol converter is an electronic device which is used for protocol conversion.

However, protocol conversion can also take place through software.

- (b) Communication software manages the flow of data across a network. Communication software is written to work with a wide variety of protocols, which are rules and procedures for exchanging data. It performs the following functions:
- (i) **Access control:** Linking and disconnecting different devices; automatically dialing and answering telephones; restricting access to authorized users; and establishing parameters such as speed, mode, and direction of transmission.
 - (ii) **Network management:** 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.
 - (iii) **Data and file transmission:** Controlling the transfer of data, files, and messages among various devices.
 - (iv) **Error detection and control:** Ensuring that the data sent is indeed the data received.
 - (v) **Data security:** Protecting data during transmission from unauthorized access.
14. (a) Features of Synchronous transmission are discussed below.
- The bits are transmitted at fixed rate.
 - The transmitter and receiver both use the same clock signals for synchronisation.
 - It allows characters to be sent without start-stop bit.
 - It allows data to be sent as multi-word block.
 - Synchronisation bit is placed at the beginning and end of each block.
 - It is faster but more expensive transmission.
 - Because the data is transmitted at fixed rate, the chances of data loss during transmission can happen.
 - It is more efficient and faster technique of data transmission.
- (b) There are three Data transmission modes as discussed below.
- (i) **Simplex:** A simplex communication mode permits data to flow in only one direction, from the transmitter to the receiver. 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.

- (ii) **Half duplex:** In this mode, 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 of time. This type of connection makes it is possible to have bidirectional communications using the full capacity of the line.
- (iii) **Full duplex:** A full duplex connection can simultaneously transmit and receive data between two stations. The data is transmitted and received at the same time, which mean the bandwidth is divided in two for each direction of data transmission for single communication medium. 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.

15. (a) The following factors have contributed to the growth of LAN:

- (i) **Security:** Security for programs and data can be achieved using servers that are locked through both software and physical means such as diskless nodes.
- (ii) **Expanded PC usage through inexpensive workstations :** Once a LAN has been set up, it actually costs less to automate all processes as existing PCs can be easily converted into nodes by adding network interface card.
- (iii) **Distributed Processing:** LAN with inter-user communication and information exchange helps to develop distributed processing system.
- (iv) **Electronic mail and Message Broadcasting:** E-mail allows users to communicate more easily among themselves through a mail-box on the server.
- (v) **Organisational Benefit:** The information flow becomes a lot smoother with various departments, having the ability to access or request for information and data pertinent to them. Besides these, it leads to reduction in costs of Hardware, Software, and also in time, and cost of training on manpower to use the system.
- (vi) **Data Management Benefit:** Since data is located centrally on the server, it becomes much easy to manage it, as well as back it up.
- (vii) **Software cost and upgradation:** Network version software cost is less compared to single version software. Software upgrade is easy as package is stored centrally on the server.

(b) Main attributes of Local Area Networks are discussed below.

- (i) Inexpensive transmission media is used to connect computers in limited geographical area mainly through coaxial cable.

- (ii) Inexpensive devices like modems, repeaters and transceiver is used to interface with the transmission media.
 - (iii) It provides easy physical connection of devices to the media.
 - (iv) It provides high data transmission rates between source and the destination.
 - (v) Network data transmissions is easier for the devices with different transmission rates in the network.
 - (vi) It provides high degree of interconnection between the network devices.
 - (vii) All devices have the potential to communicate with other devices on the network.
 - (viii) It does not provide central controlling processor on the network.
 - (ix) Each attached device may only hear and does not necessarily process messages or instructions.
16. (a) There are at least six reasons for the Internet's dramatic impact on the scope of E-Commerce. They are:
- (i) **Universality:** Any business using the Internet can interact with any other business using the Internet.
 - (ii) **Reach:** The Internet is everywhere as large cities and small towns are connected throughout the modern and developing world.
 - (iii) **Performance:** The Internet provides its users with a high-function window to the world, in addition to handling everyday networking tasks such as electronic mail; and visual images, audio clips and other large electronic objects.
 - (iv) **Reliability:** Internet technology is highly robust and reliable as the design concepts for it came out of the U.S. Department of Defence.
 - (v) **Cost:** Internet costs are lower as compared to the alternative networking technologies.
 - (vi) **Momentum:** Millions of individuals are already connected to the Internet and business use is increasing at a dramatic rate.
- (b) General Management concerns in E-Commerce are as follows:
- (i) **Loss of Paper audit trail:** Since no paper work is involved in doing the business transactions electronically, hence keeping the track of business activities will be difficult.
 - (ii) **Business Continuity:** In E-Commerce, all the transactions are done with the help of computers, hence if computer system fails then entire business organization will be paralyzed.

- (iii) **Exposure of data to third parties:** Due to sharing of data among organizations, there is possibility of exposure of secret information to other parties.
 - (vi) **Potential Legal Liability:** The inability to complete transactions or meet deadlines, or the risk of inadvertently exposing information of trading partners poses legal risks.
 - (v) **Record retention and retrievability:** Electronic information is required to be kept safely as a statutory requirement, therefore organizations will have to take appropriate measures for the safety of data.
 - (vi) **Segregation of duties:** There are more chances of fraud in an electronic environment. Hence, duties of various persons working in electronic environment must be properly defined, in order to fix their responsibilities at later stages.
17. (a) **Customer Relationship Management (CRM)** includes the methodologies, technology and capabilities that help an enterprise manage customer relationships. The general purpose of CRM is to enable organizations to manage their customers in a better way through the introduction of reliable systems, processes and procedures. Customer Relationship Management is a corporate level strategy which focuses on creating and maintaining lasting relationships with its customers.
- To be effective, the CRM process needs to be integrated end-to-end across marketing, sales, and customer service. A good CRM program needs to:
- (i) Identify customer success factors;
 - (ii) Create a customer-based culture;
 - (iii) Adopt customer-based measures;
 - (iv) Develop an end-to-end process to serve customers;
 - (v) Recommend what questions to ask to help a customer solve a problem;
 - (vi) Recommend what to tell a customer with a complaint about a purchase;
 - (vii) Track all aspects of selling to customers and prospects as well as customer support.
- (b) **Purposes of a Customer Relationship Management** – A good CRM program allows a business to acquire customers, service to the customer, increase the value of the customer to the company, retain good customers, and determine which customers can be retained or given a higher level of service. A good CRM program can improve customer service by facilitating communication in several ways.
- (i) Provide product information, product use information, and technical assistance on web sites that are accessible round the clock.

- (ii) Identify how each individual customer defines quality, and then design a service strategy for each customer based on these individual requirements and expectations.
 - (iii) Provide a fast mechanism for managing and scheduling follow-up sale calls to assess post-purchase cognitive dissonance, repurchase probabilities, repurchase times, and repurchase frequencies.
 - (iv) Provide a mechanism to track all points of contact between a customer and the company, and do it in an integrated way so that all sources and types of contact are included, and all users of the system can see the same view of the customer. It reduces confusion against customers.
 - (v) Help to identify potential problems quickly, before they occur.
 - (vi) Provide a user-friendly mechanism for registering customer complaints (complaints that are not registered with the company cannot be resolved, and are a major source of customer dissatisfaction).
 - (vii) Provide a fast mechanism for handling problems and complaints.
 - (viii) Provide a fast mechanism for correcting service deficiencies.
 - (ix) Use Internet cookies to track customer interests and personalize product offerings accordingly.
 - (x) Use the Internet to engage in collaborative customization or real-time customization.
 - (xi) Provide a fast mechanism for managing and scheduling maintenance, repair, and on-going support.
 - (xii) Integration with other cross-functional systems and thereby provide accounting and production information to customers when they require it.
18. (a) **Electronic Data Interchange (EDI)** : EDI is the transmission, in a standard syntax, of unambiguous information of business or strategic significance between computers of independent organizations.

In simple terms, EDI is computer-to-computer communication using a standard data format to exchange business information electronically between independent organizations. EDI no longer merely aids in transmitting documents, but dynamically moves data between companies' computer systems. The computer-to-computer transfer can be direct, between two companies using an agreed upon data protocol, or it can be performed by a third-party service vendor. Users can transmit business documents such as purchase orders, price quotes, shipping notices, and even payment orders electronically to customers and suppliers. The format for data transmission between trading partners via common

carrier, is governed by a predetermined and institutionally agreed upon set standards.

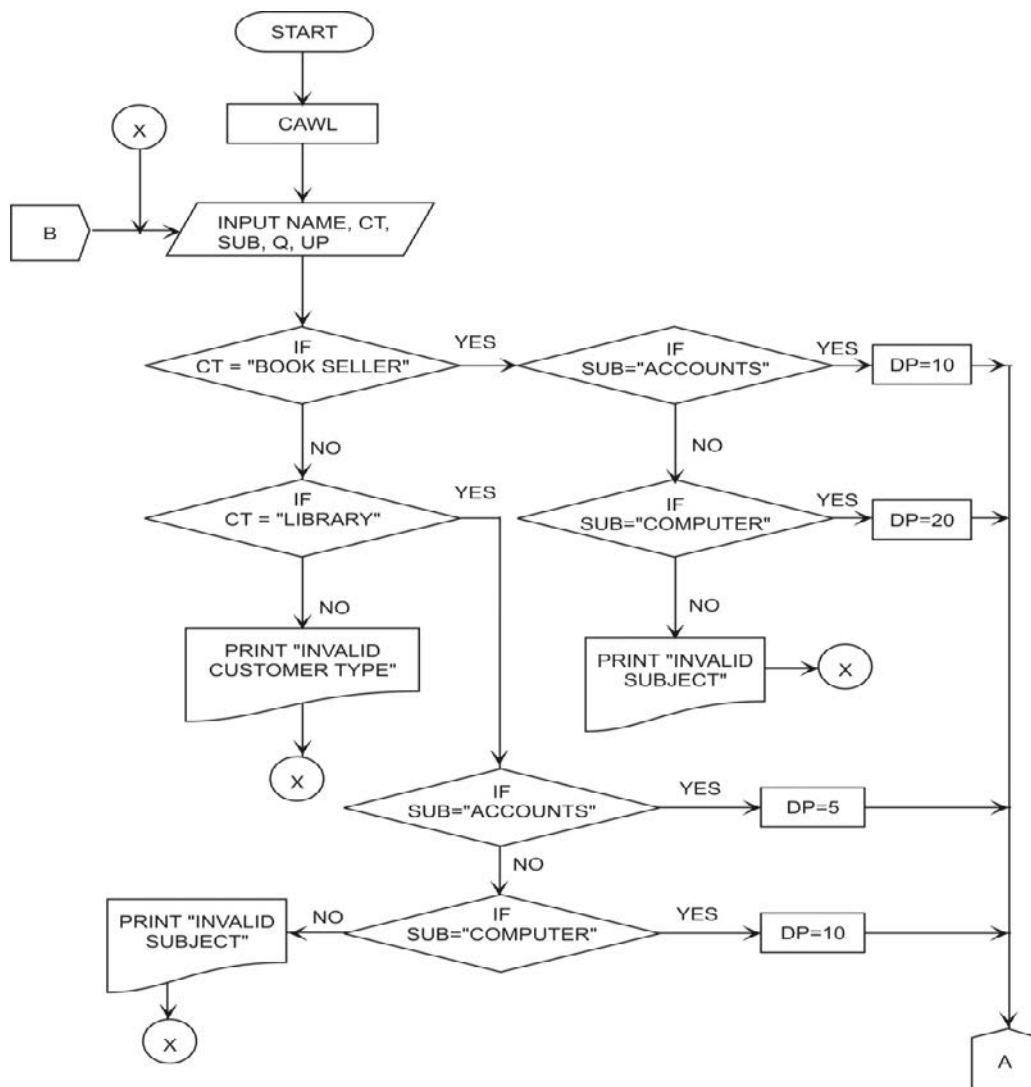
Advantages of Electronic Data Interchange (EDI) are as stated below:

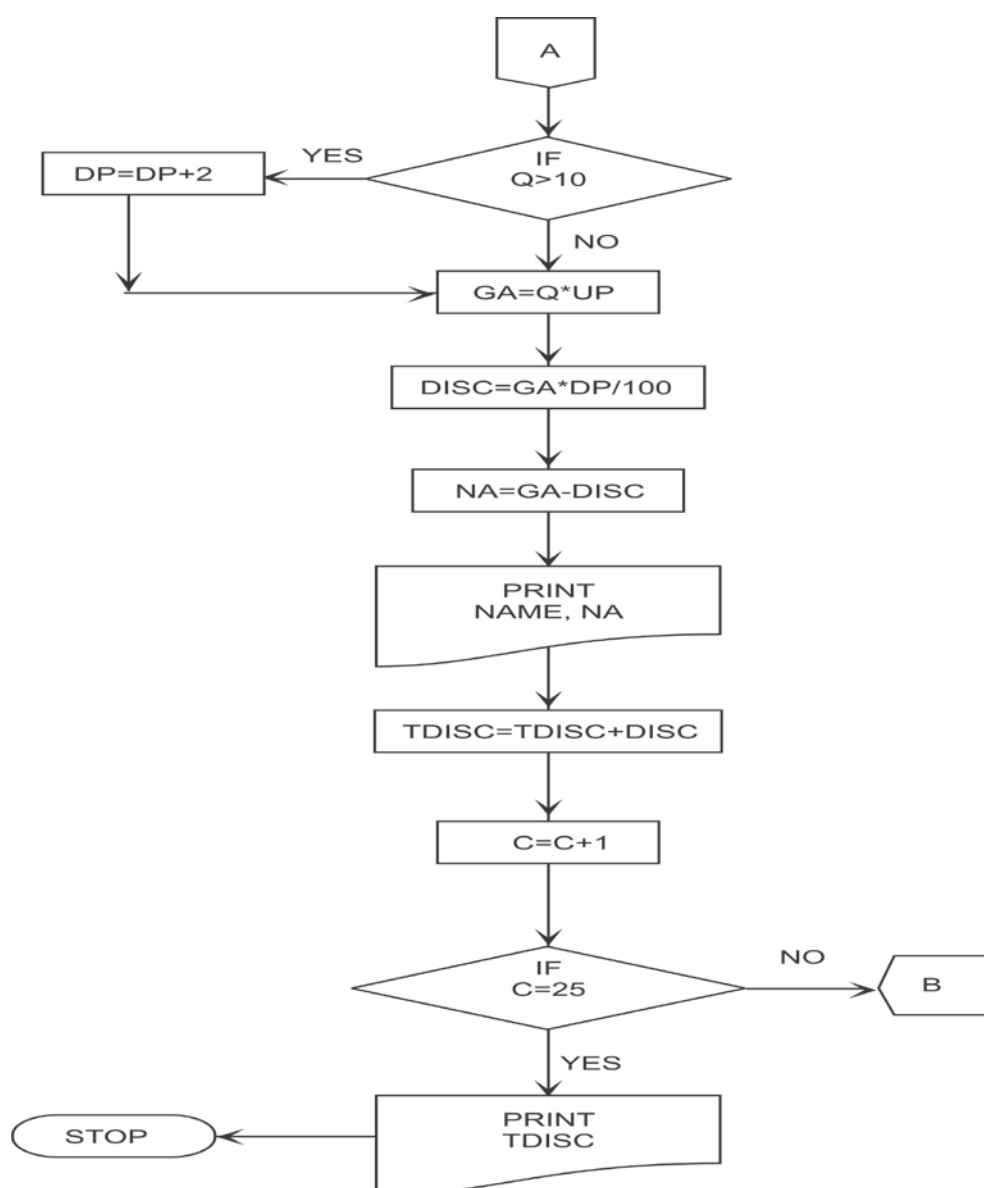
- (i) **Issue and receive orders faster** - Since most purchasing transactions are routine, they can be handled automatically, utilizing the staff for more demanding and less routine tasks.
 - (ii) **Make sales more easily** - Quotes, estimates, order entry and invoicing will proceed more smoothly and efficiently. Orders received electronically ensure that information is available immediately, so that an organization can respond faster and be more competitive.
 - (iii) **Get paid sooner** - Invoices received electronically can be reconciled automatically, which means they are earmarked for fast payment. In turn, the purchase department is in a position to negotiate for better terms including faster payments.
 - (iv) **Minimize capital tied up in inventory** - For manufacturing organization with a just-in-time strategy, the right balance is crucial, but every organization stands to benefit from reducing order lead times.
 - (v) **Reduce letters and memos** - Letters and memos do not follow rigid rules for formatting. They can be handled by an electronic mail system.
 - (vi) **Decrease enquiries** - Customers or suppliers can make direct on-line enquiries on product availability, or other non-sensitive information instead of consuming the staff's precious time.
 - (vii) **Make bulk updates of catalogues and parts listings** - One can provide updates of data files, such as catalogues to customers or part listings to franchisees.
- (b) EFT stands for "Electronic Funds Transfer" that represents the way the business can receive direct deposit of all payments from the financial institution to the company bank account. EFT is fast and safe in transferring the money to and from user's bank account quicker than to wait for mail, deposit the cheque, and wait for the funds to become available. This payment mechanism moves money between accounts in a fast, paperless way. The different EFT systems in operation are as follows:
- (i) **Automated Teller Machines (ATMs)**: This allow the consumer to do their banking without assistance of a human teller. These machines are used with a debit or EFT card and a code, which is often called a Personal Identification Number or "PIN."
 - (ii) **Point-of-Sale (POS) Transactions**: Some debit or EFT cards allow transfer of funds electronically from the consumer's account to the merchant's account while shopping. For payment the consumer presents an EFT card instead of cheque or cash. Money is taken out of the consumer's account and

put into the merchant's account electronically.

- (iii) **Preauthorized Transfers:** The account holder authorizes the bank or a third party to withdraw or deposit the funds from or into his account. For example, consumers can authorize direct electronic deposit of wages, dividend payments, payments of insurance, utility and other bills to and from their accounts.
- (iv) **Telephone Transfers:** Consumer can transfer funds from one account to another account by telephonic instructions.

19. The required flowchart is given below.



**Abbreviations:-**

CAWL - Clear All Working Locations

CT - Customer Type

SUB - Subject

Q - Quantity

DP - Discount Payable

UP-Unit Price

GA - Gross Amount

NA - Net Amount

DISC - Discount

TDISC - Total Discount

20. Decision Table

Rules	
	1. 2. 3. 4.
Conditions	Condition entries
Sales region code $\leq$ SRC100.	Y Y N N
Invoice amount $<$ ₹ 50,000	Y N Y N
Action Stub	Action entry
Delivery charges	
Add ₹ 1000 to invoice total	X
Add ₹ 500 to invoice total	X
Add ₹ 250 to invoice total	X
Add ₹ 150 to invoice total	X

PAPER – 6 : INFORMATION TECHNOLOGY AND STRATEGIC MANAGEMENT

SECTION – B : STRATEGIC MANAGEMENT

QUESTIONS

1. (i) State with reasons which of the following statements are correct/incorrect:
 - (a) BCG growth share matrix classifies businesses on two dimensional scale.
 - (b) Socio-cultural environment consists of factors related to government and politics.
 - (c) First step in strategic management model is developing a strategic vision and mission.
 - (d) TQM involves discrete improvements in the organisational setup.
 - (e) Divestment strategy involves the sale or liquidation of a portion of business.
 - (f) The scope of supply chain management is wider than logistic management.
 - (g) Balance scorecard serves both financial and strategic purposes.
 - (h) BPR refers to the analysis and redesign of workflows within the organisation and with the external entities.
 - (i) The thrust of operational control is on individual tasks or transactions.
- (ii) Fill in the blanks in the following statements with the most appropriate word:
 - (a) To identify those competences which critically underpin the organization's competitive advantage are known as _____.
 - (b) The process of creating, maintaining, and enhancing strong, value- laden relationships with customers and other stakeholder is _____.
 - (c) Under Porters five forces new entrants are _____ source of competition.
 - (d) A _____ consists of those rival firms with similar competitive approaches and positions in the market.
 - (e) In Michael Porter's generic strategy _____ emphasizes producing standardized products at a very low per unit-cost for consumers who are price sensitive.
2. Write short note on:
 - (a) Premise control
 - (b) Unfreezing for change
 - (c) Transformational leadership
 - (d) Strategic groups

(e) Conglomerate diversification

3. What is globalisation? Why do companies go global?
4. Discuss the role of research and development in strategic implementation.
5. Define a mission statement. Why the organizations should have mission? And what are the points which are useful while writing a mission for a company?
6. Discuss various issues in analysis of competition in an industry?
7. What is a corporate strategy? Explain the stages of corporate strategy formulation implementation process.
8. Define corporate Culture. How culture can promote better strategy execution?
9. Discuss six sigma. What are six sigma methodologies for new products or services?
10. What is Strategic Management? What benefits accrue by following a strategic approach to managing?
11. What do you understand by 'Strategy'? Explain the four generic strategies as discussed by Glueck and Jauch.
12. Describe the construction of BCG matrix and discuss its utility in strategic management.
13. ABC Group with net worth of more than Rs 5000 crores is engaged in manufacturing of juices, confectionaries and ready to eat foods. In May, 2005 it acquired loss-making soft drink major XYZ Ltd at a cost of Rs. 357 crores. The acquisition helped the group to enter aerated drinks segment having a growth rate of 10% per annum. It was financed through internal sources and bank loan of Rs 250 crores. Various brands of XYZ were popular with the customers, however still the company was in losses. At the time of acquisition, the accumulated losses of the company were Rs 80 crores. Immediately after the takeover the group restructured the operations of XYZ Ltd leading to its turnaround. In the year 2004-05, prior to acquisition, XYZ Ltd had incurred a loss of about Rs. 12 crores. After being acquired the company was able to wipe out all accumulated losses in the initial four years. The company also declared a dividend of 15% for the year 2010-11. The share that was trading at Rs 9 below its par value of Rs 10 is now at Rs 54.

While restructuring the operations of XYZ, production and marketing activities were bifurcated. For post production activities separate strategic units were created for managing Indian and international affairs. Indian operations were managed by separate offices located in New Delhi, Mumbai, Bangalore and Chennai. Before acquisition, an office was maintained in Singapore to control all international activities. In the restructuring, Singapore office was dispensed with and separate profit centres were created in major international markets.

Each of these units was autonomous to make its own plans and take decisions. Overall performance of each unit was compared on monthly basis. The unit with the best

improvement in the performance was named as the unit of the month and its head was given company paid one week holiday.

The ABC Group is also shifting XYZ's focus on retailing bulk soft drink through automatic dispensing units installed at movie halls, theatres, railway stations, bus stands and airports. In comparison to bottling, the new approach helped in reduction in distribution costs. Currently, the sale through bulk vending is only 5%. In a year's time the ratio is estimated to be 90:10. It is planned that the channel will be further expanded in five years and by that time the ratio is expected to be 60:40.

While restructuring, mapping of individuals was done with different jobs. In the process, some of the employees of the XYZ Ltd were found to be not fitting well in the new structure. They were shifted to other companies of the group with lucrative packages.

The company also worked on improvement in quality and reduction in costs. Any useful idea that helped in cost-cutting or improvement in the processes was also suitably rewarded. The company focussed on the reduction of inventory levels after acquisition with better linkages with the suppliers, distributors and customers. The efforts helped in the reduction of bottling costs by 10%.

Questions:

- (a) What strategies were adopted by the ABC Group to turnaround the loss making XYZ Ltd.?
 - (b) What are the strengths of ABC Group?
 - (c) Is it a wise decision of ABC Group to take such borrowings to finance the acquisition?
14. Television industry in India is huge with hundreds of channels broadcasting thousands of programmes at national and regional level. The small screen is a popular way of entertainment in Indian households. There are a number of channels in different categories such as family, music, sports, news and movies. There is intense competition with each channel vying to get the viewership. Revenues are directly related to the TRPs generated by the programmes.

For the global music industry, Indian television broadcasting market brought huge opportunity. Gradually the number of players increased and the competition became cut-throat.

The struggle got very aggressive when two foreign owned music channels entered the Indian market. Two channels 'Fusion' and 'Melody' were launched almost simultaneously investing heavily in the infrastructure and other resources. The competition became unhealthy and the channel started copying each other. Often it led to personal war of words between the two heads of each channel.

Music channel Fusion was distributed in an arrangement with an Indian group as its bouquet. With the reach of the group fusion became more popular and attained number one position in the country. Melody was ranked number two in the market.

Melody's management decided that it needed to reposition the image of the channel and differentiate the service from the competitor. Consequently, Melody changed its image from a music channel to that of a youth channel. The aim of the repositioning was to develop the music industry from an "Indian kid's point of view."

Secondly, Melody reduced the number of Hindi film clips and allowed more programs in various regional languages such as Tamil, Bengali, etc. The channel also increased the amount of Western music delivered, two hours of prime time every day to international music.

There were other strategies that were adopted to cope up with competition by both Melody and Fusion. Melody aggressively engaged themselves in events marketing in the form of hosting spectacular road shows and dance parties. This helped them in getting acceptance and develop the local music sense within the company.

By implementing these strategic changes, Melody was able to come back and get a commendable position to face the contemporary competition in the Indian music industry. It became number 1 youth channel in India with viewership better than Fusion.

Questions:

- (a) Discuss the Indian television Industry.
- (b) What strategies are opted by Melody?
- (c) Explain the position of Fusion?
- (d) Why 'war of words' happen between the heads of two channels?

SUGGESSTED ANSWERS/HINTS

1. (i) (a) **Correct:** The BCG growth share matrix represent businesses on a two-dimensional scale. The vertical axis represents market growth rate and provides a measure of market attractiveness. The horizontal axis represents relative market share and serves as a measure of company strength in the market. On the basis of different positions of the businesses on the matrix they are classified as stars, cash cows, question marks and dogs.
- (b) **Incorrect:** Socio-cultural environment consist of factors related to human relationships and the impact of social attitudes and cultural values which have bearing on the business of organizations. The beliefs, values and norms and general fabric of society determine how individuals and organizations are interrelated with each other.

- (c) **Correct:** Identifying an organisation's existing vision, mission, objectives are the starting point for any strategic management process. Determining vision and mission provides long-term direction, delineate what kind of enterprise the company is trying to become and infuse the organisation with a sense of purposeful action.
- (d) **Incorrect:** TQM aims at continual increase in customer satisfaction at continually lower real cost. It is a total system approach that works across functions and departments. It involves all employees, top to bottom, and extends backward and forward to include the supply chain. TQM stresses learning and adaptation to continual change as keys to organizational success.
- (e) **Correct:** Divestment strategy involves the sale or liquidation of a portion of business, or a major division, profit centre or SBU. Divestment is usually a part of rehabilitation or restructuring plan and is adopted when a turnaround has been attempted but has proved to be unsuccessful. The option of a turnaround may even be ignored if it is obvious that divestment is the only answer.
- (f) **Correct:** Supply chain management is an extension of logistic management. Logistic management is related to planning, implementing and controlling the storage & movement of goods & services while supply chain management is much more than that. It is a tool of business transformation and involves delivering the right product at the right time to the right place and at the right price.
- (g) **Incorrect:** Balance scorecard serves a combination of strategic and financial objectives. It measure company performance, requires setting both financial and strategic objectives and tracking their achievements. Unless a company is in deep financial difficulty, such that its very survival is threatened, company managers may like to put more emphasis on achieving strategic objectives than on achieving financial objectives whenever a trade-off has to be made.
- (h) **Correct:** BPR stands for business process reengineering. It refers to the analysis and redesign of workflows both within and between the organisation and the external entities. Its objective is to improve performance in terms of time, cost, quality, and responsiveness to customers. It implies giving up old practices and adopting the improved ones. It is an effective tool of realising new strategies.
- (i) **Correct:** The thrust of operational control is on individual tasks or transactions as against total or more aggregative management functions. For example, procuring specific items for inventory is a matter of operational control, in contrast to inventory management as a whole. One of the tests that can be applied to identify operational control areas is that there should be a clear-cut and somewhat measurable relationship between inputs and outputs which could be predetermined or estimated with least uncertainty.

- (ii) (a) Core competencies.
 - (b) Relationship marketing.
 - (c) Insignificant.
 - (d) Strategic group
 - (e) Cost leadership
2. (a) A strategy is formed on the basis of certain assumptions or premises about the complex and turbulent organizational environment. Over a period of time these premises may not remain valid. Premise control is a tool for systematic and continuous monitoring of the environment to verify the validity and accuracy of the premises on which the strategy has been built. It primarily involves monitoring two types of factors:
- (i) Environmental factors such as economic (inflation, liquidity, interest rates), technological, social, legal and regulatory factors.
 - (ii) Industry factors such as competitors, suppliers, substitutes.

It is neither feasible nor desirable to control all types of premises in the same manner. Different premises may require different amount of control. Thus, managers are required to select those premises that are likely to change and would severely impact the functioning of the organization and its strategy.

- (b) The process of unfreezing simply makes the individuals or organizations aware of the necessity for change and prepares them for such a change. Lewin proposes that the changes should not come as a surprise to the members of the organization. Sudden and unannounced change would be socially destructive and morale lowering. The management must pave the way for the change by first “unfreezing the situation”, so that members would be willing and ready to accept the change.

Unfreezing is the process of breaking down the old attitudes and behaviours, customs and traditions so that they start with a clean slate. This can be achieved by making announcements, holding meetings and promoting the ideas throughout the organization.

- (c) Transformational leadership style use charisma and enthusiasm to inspire people to exert them for the good of the organization. Transformational leadership style may be appropriate in turbulent environments, in industries at the very start or end of their life-cycles, in poorly performing organizations when there is a need to inspire a company to embrace major changes. Transformational leaders offer excitement, vision, intellectual stimulation and personal satisfaction. They inspire involvement in a mission, giving followers a ‘dream’ or ‘vision’ of a higher calling so as to elicit more dramatic changes in organizational performance. Such a leadership motivates followers to do more than originally affected to do by stretching their abilities and

increasing their self-confidence, and also promote innovation throughout the organization.

- (d) Strategic groups are conceptually defined clusters of competitors that share similar strategies and therefore compete more directly with one another than with other firms in the same industry. Strong economic compulsions often constrain these firms from switching one competitive posture to another. Any industry contains only one strategic group when all firms essentially have identical strategies and have comparable market positions. At the other extreme, there are as many strategic groups as there are competitors when each rival pursues a distinctively different competitive approach and occupies a substantially different competitive position in the market place.
 - (e) Conglomerate diversification is a totally unrelated diversification. No linkages exist between the existing and new businesses / products. They are disjointed in processes, technology. Conglomerate diversification has no common thread with the firm's present position.
3. Refer to Chapter 1. The term globalization refers to increase in the interrelations and interdependencies of various countries. With the reduction in barriers the businesses are expanding in an unprecedented manner beyond geographical boundaries. Globalised era has led to improvement in the flow of goods, capital, services and labour. There are several reasons why companies go global. Major reasons for going global are as follows:
- .. There is rapid shrinking of time and distance across the globe on account of faster communication, speedier transportation, growing financial flows and rapid technological changes.
 - .. Domestic markets may get saturated over a period of time.
 - .. A successful new product does not remain limited to one geographical area or country. It gradually generates demand from other parts of the globe.
 - .. Another reason for going overseas may also vary by industry. Petroleum and mining companies often go global to secure a reliable or cheaper source of raw-materials.
 - .. Companies set up overseas plants to reduce high transportation costs.
 - .. The motivation to go global in technology driven companies can be taking advantages of cheaper manpower.
4. Refer to Chapter 5. Research and development (R&D) personnel can play an integral part in strategy implementation. These individuals are generally charged with developing new products and improving old products in a way that will allow effective strategy implementation. R&D employees and managers perform tasks that include transferring complex technology, adjusting processes to local raw materials, adapting processes to local markets, and altering products to particular tastes and specifications. Strategies such as product development, market penetration, and concentric diversification require

that new products be successfully developed and that old products be significantly improved.

R&D policies can enhance strategy implementation efforts to:

- .. Emphasize product or process improvements.
 - .. Stress basic or applied research.
 - .. Be leaders or followers in R&D.
 - .. Develop robotics or manual-type processes.
 - .. Spend a high, average, or low amount of money on R&D.
 - .. Perform R&D within the firm or to contract R&D to outside firms.
 - .. Use university researchers or private sector researchers.
5. Refer to Chapter 2. A company's Mission statement is typically focused on its present business scope – "who we are and what we do"; mission statements broadly describe an organizations present capabilities, customer focus, activities, and business makeup.

Why organization should have mission?

- .. To ensure unanimity of purpose within the organization.
- .. To provide a basis for motivating the use of the organization's resources.
- .. To develop a basis, or standard, for allocating organizational resources.
- .. To establish a general tone or organizational climate, for example, to suggest a businesslike operation.
- .. To serve as a focal point for those who can identify with the organization's purpose and direction.
- .. To facilitate the translation of objective and goals into a work structure involving the assignment of tasks to responsible elements within the organization.
- .. To specify organizational purposes and the translation of these purposes into goals in such a way that cost, time, and performance parameters can be assessed and controlled.

Following points are useful while writing mission of a company:

- .. One of the roles of a mission statement is to give the organization its own special identity, business emphasis and path for development – one that typically sets it apart from other similarly situated companies.
- .. A company's business is defined by what needs it trying to satisfy, by which customer groups it is targeting and by the technologies and competencies it uses and the activities it performs.

- .. Technology, competencies and activities are important in defining a company's business because they indicate the boundaries on its operation.
 - .. Good mission statements are highly personalized – unique to the organization for which they are developed.
6. Refer to chapter 3. Industry and competitive analysis can be done using a set of concepts and techniques to get a clear fix on key industry traits, the intensity of competition, the drivers of industry change, the market positions and strategies of rival companies, the keys to competitive success, and the industry's profit outlook. It provides a way of thinking strategically about any industry's overall situation and drawing conclusions about whether the industry represents an attractive investment for company funds. The analysis entails examining a company's business in the context of a much wider environment. Industry and competitive analysis aims at developing insight in several issues. Analysing these issues build understanding of a firm's surrounding environment and, collectively, form the basis for matching its strategy to changing industry conditions and competitive realities. The issues are given below:
- .. Dominant economic features of the industry.
 - .. Nature and strength of competition.
 - .. Triggers of change.
 - .. Identifying the companies that are in the strongest/weakest positions.
 - .. Likely strategic moves of rivals.
 - .. Key factors for competitive success.
 - .. Prospects and financial attractiveness of industry.
7. Refer to chapter 4. We can describe corporate strategy as the objective-strategy design of the firm. To arrive at such an objective-strategy design is the basic burden of corporate strategy formulation.
- Crafting and executing a company's strategy is a five-stage managerial process as given below:
- (i) Developing a strategic vision of where the company needs to head and what its future product-customer-market-technology focus should be.
 - (ii) Setting objectives and using them as yardsticks for measuring the company's performance and progress.
 - (iii) Crafting a strategy to achieve the desired outcomes and move the company along the strategic course that management has charted.
 - (iv) Implementing and executing the chosen strategy efficiently and effectively.

- (v) Monitoring developments and initiating corrective adjustments in the company's long-term direction, objectives, strategy, or execution in light of the company's actual performance, changing conditions, new ideas, and new opportunities.

8. Refer to chapter 6. Every business organisation has a unique organizational culture. Each business has its own philosophy and principles, its own ways of approaching problems and making decisions, its own work climate. An organisation has its own embedded patterns of how to do things. Its own ingrained beliefs, behaviour and thought patterns, and practices define its corporate culture.

Strong cultures promote good strategy execution when there's fit and hurt execution when there's negligible fit. A culture grounded in values, practices, and behavioural norms that match what is needed for good strategy execution helps energize people throughout the company to do their jobs in a strategy-supportive manner, adding significantly to the power and effectiveness of strategy execution. For example, a culture where frugality and thrift are values strongly shared by organizational members is very conducive to successful execution of a low cost leadership strategy. A culture where creativity, embracing change, and challenging the status quo are pervasive themes is very conducive to successful execution of a product innovation and technological leadership strategy. A culture built around such business principles as listening to customers, encouraging employees to take pride in their work, and giving employees a high degree of decision-making responsibility is very conducive to successful execution of a strategy of delivering superior customer service.

9. Refer to chapter 7. Primarily Six Sigma means maintenance of the desired quality in processes and end products. It means taking systemic and integrated efforts toward improving quality and reducing cost.

It is a highly disciplined process that helps in developing and delivering near-perfect products and services. It strives to meet and improve organizational goals on quality, cost, scheduling, manpower, new products and so on. It works continuously towards revising the current standards and establishing higher ones.

For implementing six sigma for new products, processes and services we use DMADV: DMADV is acronym for the steps followed in implementing six sigma. They are (i) define, (ii) measure, (iii) analyze, (iv) design and (v) verify.

10. Refer to chapter 2. In a highly competitive marketplace, companies can operate successfully by creating and delivering superior value to target customers and also learning how to adapt to a continuously changing business environment. Strategic management starts with developing a company mission, objectives and goals, business portfolio, and functional plans. The overall objective of strategic management is two-fold:

- “ To create competitive advantage, so that the company can outperform the competitors in order to have dominance over the market.
- “ To guide the company successfully through all changes in the environment.

The following are the benefits of strategic approach to managing:

- .. Strategic management helps organisations to be more proactive instead of reactive in shaping its future.
 - .. Strategic management provides guidance and framework for all the major business decisions of an enterprise such as decisions on products, markets, investments and organisational structure.
 - .. Strategic management is concerned with ensuring a good future for the firm. Organisations are able to identify the available opportunities and identify ways and means as how to reach them.
 - .. Strategic management serves as a corporate defense mechanism against mistakes and pitfalls. It helps organisations to avoid costly mistakes in product market choices or investments.
11. Refer to chapter 4. Businesses have to respond to a dynamic and often hostile environment for pursuit of their mission. Strategies provide an integral framework for management and negotiate their way through a complex and turbulent external environment. Strategy seeks to relate the goals of the organisation to the means of achieving them.
- .. A company's strategy is the game plan management is using to stake out market position and conduct its operations. A company's strategy consists of the combination of competitive moves and business approaches that managers employ to please customers, compete successfully and achieve organisational objectives.
 - .. Strategy may be defined as a long range blueprint of an organisation's desired image, direction and destination what it wants to be, what it wants to do and where it wants to go. Strategy is meant to fill in the need of organisations for a sense of dynamic direction, focus and cohesiveness.

According to Glueck and Jauch there are four generic ways in which strategic alternatives can be considered. These are stability, expansion, retrenchment and combinations.

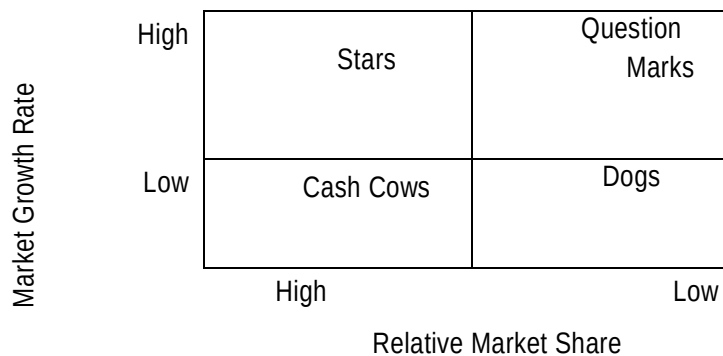
- .. Stability strategies.
 - .. Expansion strategy.
 - .. Retrenchment strategy.
 - .. Combination strategies.
12. Refer to chapter 3. Companies that are large enough to be organized into strategic business units face the challenge of allocating resources among those units. In the early 1970's the Boston Consulting Group developed a model for managing a portfolio of different business units or major product lines. The BCG growth-share matrix named

after its developer facilitates portfolio analysis of a company having invested in diverse businesses with varying scope of profits and growth.

The BCG matrix can be used to determine what priorities should be given in the product portfolio of a business unit. Using the BCG approach, a company classifies its different businesses on a two-dimensional growth share matrix. Two dimensions are market share and market growth rate. In the matrix:

- “ The vertical axis represents market growth rate and provides a measure of market attractiveness.
- “ The horizontal axis represents relative market share and serves as a measure of company strength in the market.

Thus the BCG matrix depicts four quadrants as per following:



Different types of business represented by either products or SBUs can be classified for portfolio analysis through BCG matrix. They have been depicted by meaningful metaphors, namely Stars, Cash Cows, Question Marks and Dogs.

The BCG matrix is useful for classification of products, SBUs, or businesses, and for selecting appropriate strategies for each type as follows.

- (a) Build with the aim for long-term growth and strong future.
- (b) Hold or preserve the existing market share.
- (c) Harvest or maximize short-term cash flows.
- (d) Divest, sell or liquidate and ensure better utilization of resources elsewhere.

Thus BCG matrix is a powerful tool for strategic planning analysis and choice.

13. This case is for your practice. Remember, there is no rigid solution to a case problem. You can arrive at your own solutions. The opinions differ and your approach will also be different. However, you must offer supporting evidence for your views and judgments.

In part (a) you need to think and write all the strategies followed by ABC group like restructuring, creating profit centres. In part (b) ABC group has used its all the functional strategies well so its main strength is its planning and implementation of functional

strategies. In part (c) you need to highlight the risks associated with borrowings. Organisations need to take a cautious view. However, some risk is necessary for growth.

For answering the questions, students should draw inferences from theoretical concepts of strategic management and integrate them. You should not rely upon unsupported opinions and over generalizations and clearly demonstrate that your interpretations are reasonable, logical and objective. You may also take cues from what you have learnt from newspapers and other business magazines.

14. This case is again for practice. In part (a) discuss the nature of Indian television industry. You may highlight the position of state broadcaster (Doordarshan) in the initial years and explain the present position. In part (b) you should trace out all the strategies adopted by Melody like shift from music channel to youth channel, reduction in the number of Hindi film clips and allow other regional languages, etc. In part (c) highlight the advantages of associating with an bouquets of channels and how Fusion got initial benefits. In part (d) explain the pressures on CEOs / heads to succeed that often creates stress and lead to unhealthy clashes. Students must bring out that such situations should be avoided.