PAPER – 7: INFORMATION TECHNOLOGY AND STRATEGIC MANAGEMENT
SECTION – A: INFORMATION TECHNOLOGY
QUESTIONS

1. Define the following terms briefly:

    (i)   Language Translators   (ii) Shareware

    (iii) Spooling Software   (iv) Artificial Intelligence

    (v)   Electronic Mail   (vi) Candidate Key

    (vii) Hub   (viii) Network File Server

    (ix) World Wide Web   (x)   Telnet

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

    (i) $(10001)_2$ = ($)_{10}$

    (ii) $(845)_{10}$ = ($)_2$

    (iii) $(35.25)_{10}$ = ($)_2$

    (iv) $(11001101.11)_2$ = ($)_{10}$

3. Distinguish between the following:

    (i)   Local Area Network and Wide Area Network

    (ii)   Unstructured Threats and Structured Threats

    (iii) Application Software and System Software

    (iv)   Third Generation Languages and Fourth Generation Languages

    (v)   Compiler and Assembler

    (vi)   Replicated database and Partitioned database

    (vii) Common Gateway Interface and Transmission Control Protocol

    (viii) DSL Connection and VDSL Connection

    (ix)   Operational Databases and Management Databases

    (x)   Device Drivers and Utility Programs

Operating System

4. (a) What do you understand by Operating System?

    (b) What are the basic functions an operating system performs?

Expert System

5.   Define Expert System and its components in detail.

File Organization

6.   Discuss the various factors that must be considered in determining the best file organization for a particular application.

Database Management System and its Architecture

7.   (a)   What do you understand by the term Database Management System?

     (b)   Discuss its architecture in detail.

Data Warehouse and its components

8.   (a)   Define Data Warehouse.

     (b)   Discuss Data Warehouse components in detail.

Network Topologies

9.   Discuss various Network topologies and their advantages and disadvantages in detail.

Transmission Technologies

10. Discuss various Transmission Technologies.

OSI Model

11. Discuss OSI Model and its layers in detail.

Local Area Network

12. Discuss the various components of LAN.

Internet Protocol Suite

13. Discuss Internet Protocol Suite.

E-Commerce Security

14. What are the different dimensions of E-commerce security?

Flowchart

15. Draw a flow chart to calculate the local taxes as per the following details:

Code No.	Type of Goods	Tax Rate
001	Perishable	15%
002	Textiles	10%
003	Luxury Items	20%
004	Machinery	12%

SUGGESTED ANSWERS / HINTS

1. (i)   **Language Translators:** A Language Translator or language processor is a general term used for any assembler, compiler or other routine that accepts statements in one language and produces equivalent statements in another language. The language processor reads the source language statements one at a time and prepares a number of machine instructions to perform the operations specified or implied by each source statement. The three most widely used types of language translators are Compilers, Interpreters, and Assemblers.

    (ii)   **Shareware:** Shareware is software developed by individual and small companies that cannot afford to market their software world wide or by a company that wants to release a demonstration version of their commercial product. Shareware software often is disabled in some way and has a notice attached to explain the legal requirements for using the product.

    (iii)   **Spooling Software:** The purpose of spooling software is to compensate for the speed differences between the computer and its peripheral devices. Spooling software is usually encountered in large system and network computing environments.

    (iv)   **Artificial Intelligence:** Artificial intelligence (AI) is the study and design of intelligent agents where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. It is the science and engineering of making intelligent machines.

    (v)   **Electronic Mail:** Electronic Mail, abbreviated as email, is a method of composing, sending, storing, and receiving messages over electronic communication systems. The term e-mail applies both to the Internet e-mail system based on the Simple Mail Transfer Protocol (SMTP) and to intranet systems allowing users within one company to e-mail each other.

    (vi)   **Candidate Key:** A Candidate key is any set of one or more columns whose combined values are unique among all occurrences (i.e., tuples or rows). Since a null value is not guaranteed to be unique, no component of a candidate key is allowed to be null. There can be any number of candidate keys in a table.

    (vii)   **Hub:** A Hub is a multi port connecting device that is used to interconnect LAN devices. Each node is connected to the hub by means of simple twisted pair wires. The hub then provides a connection over a higher speed link to other LANs, the company's WAN, or the Internet. A hub can be used to extend the physical length of a network. Hubs can be active or passive. In case of passive hub, incoming signal is sent as it is, as output. Active hub can regenerate incoming signal and supports homogeneous network only.

    (viii)   **Network File Server:** A Network File Server is a computer system used for the purpose of managing the file system, servicing the network printers, handling

network communications, and other functions. A server may be dedicated in which case all of its processing power is allocated to network functions, or it may be non-dedicated which means that a part of the servers functions may be allocated as a workstation or DOS-based system.

(ix) World Wide Web: The World Wide Web (WWW or W3), most often called as Web, is defined as a network of computers all over the world. The fundamental unit of the Web is the Web page which is defined as a text document that contains links to other Web pages, graphic and audio files, and other Internet services such as File Transfer Protocol (FTP) and E-mail. Major functional components of the WWW are: HTML, HTTP, URIs, Web Server Hardware & Software, Web client Hardware & Browser Software and Web Hardware and Software.

(x) Telnet: Telnet is a protocol that allows us to connect to remote computers (called hosts) over a TCP/IP network (such as the Internet). We use software called a telnet client on our computer to make a connection to a telnet server (i.e., the remote host). Once our telnet client establishes a connection to the remote host, our client becomes a virtual terminal, allowing us to communicate with the remote host from our computer. In most cases, we will need to log into the remote host, which requires that we have an account on that system.

2. (i) $(10001)_2 = (\qquad)_{10}$

$$= 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 16 + 0 + 0 + 0 + 1$$

$(10001)_2 = (17)_{10}$

(ii) $(845)_{10} = (\qquad)_2$

2	845	Remainder
2	422	1
2	211	0
2	105	1
2	52	1
2	26	0
2	13	0
2	6	1
2	3	0
2	1	1
2	0	1

$(845)_{10} = (1101001101)_2$

(iii) $(35.25)_{10}$ = $(\quad)_2$

To convert the given number from Decimal Number System to Binary Number System, first we will convert mantissa part, then the fractional part into Binary Number System.

Step – I

2	35	Remainder
2	17	1
2	8	1
2	4	0
2	2	0
2	1	0
2	0	1

$(35)_{10}$ = $(100011)_2$ ……………..………(i)

Step – II   Integer Part

.25 x 2   =   0.50   0

.50 x 2   =   1.00   1

$(.25)_{10}$ = $(0.01)_2$ …………………(ii)

So, combining equations (i) and (ii), we get -

$(35.25)_{10}$ = $(100011.01)_2$

(iv) $(11001101.11)_2$ = $(\quad)_{10}$

$= 1 \times 2^7 + 1 \times 2^6 + 0 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2}$

$=$ $128 + 64 + 0 + 0 + 8 + 4 + 0 + 1 + 1/2 + 1/4$

$(11001101.11)_2$ = $(205.75)_{10}$

3. **(i)** **Local Area Network:** A typical Local Area Network (LAN) connects as many as hundred or so microcomputers that are located in a relatively small area, such as a building or several adjacent buildings. Organizations having their own LAN enable its multiple users to share software, data, and devices. LANs use a shared physical media which is routed in the whole campus to connect various systems. LANs use high-speed media (1 Mbps to 30 Mbps or more) and are mostly privately owned and operated.

    Wide Area Network: A Wide Area Network (WAN) covers a large geographic area with various communication facilities such as long distance telephone service,

satellite transmission, and under-sea cables. The WAN typically involves best computers, networks and many different types of communication hardware and software. WAN uses point-to-point links between systems. Examples of WANs are interstate banking networks and airline reservation systems. Wide Area Networks typically operate at lower link speeds (about 1 Mbps). Channels are of relatively low capacity and are relatively error-prone.

(ii) **Unstructured Threats:** These threats originate mostly from inexperienced individuals using easily available hacking tools from the Internet. Many tools available to anyone on the Internet can be used to discover weaknesses in a company's network. These include port-scanning tools, address-sweeping tools, and many others. Most of these kinds of probes are done more out of curiosity than with a malicious intent in mind.

For example, if a company's external web site is hacked; the company's integrity is damaged. Even if the external web site is separate from the internal information that sits behind a protective firewall, the public does not know that. All they know is that if the company's web site is hacked, then it is an unsafe place to conduct business.

Structured Threats: These threats originate from individuals who are highly motivated and technically competent and usually understand network systems design and the vulnerabilities of those systems. They can understand as well as create hacking scripts to penetrate those network systems. An individual who presents a structured threat typically targets a specific destination or group. Usually, these hackers are hired by organized crime, industry competitors, or state-sponsored intelligence organizations.

(iii) **Application Software:** Application Software is the computer software designed to help the user to perform single or multiple tasks. Examples include enterprise software, accounting software, office suites, graphics software, and media players. It is a loosely defined subclass of computer software that employs the capabilities of a computer directly to a task that the user wishes to perform.

The term application refers to both the application software and its implementation. Multiple applications bundled together as a package are sometimes referred to as an Application Suite. The separate applications in a suite usually have a user interface that has some commonality making it easier for the user to learn and use each application.

System Software: System Software is computer software designed to operate the computer hardware and to provide and maintain a platform for running application software. It comprises of those programs that control and support the computer system and its data processing applications.

System software helps use the operating system and computer system. It includes diagnostic tools, compilers, servers, windowing systems, utilities, language

translator, data communication programs, database systems and more. The purpose of system software is to insulate the application programmer as much as possible from the details of the computer, especially memory and other hardware features, and devices like printers, readers, displays, keyboards, etc.

(iv)

Third-Generation Languages (3GLs)	Fourth-Generation Languages (4GLs)
❖ Intended for use by professional programmer	❖ May be used by a end user as well as a professional programmer
❖ Require specification of how to perform the task	❖ Require specification of what task to perform (system determines how to perform the task
❖ Require that all alternatives be specified	❖ Have default alternatives built in; end user need not specify these alternatives
❖ Require large number of procedural instructions	❖ Require far fewer instructions (less than one-tenth in most cases)
❖ Code may be difficult to read, understand and maintain	❖ Code is easy to understand and maintain because of English-like commands
❖ Language developed originally for batch operation	❖ Language developed primarily for on-line use
❖ Can be difficult to learn	❖ Many features can be learned quickly
❖ Difficult to debug	❖ Errors easier to locate because of shorter programs, more structured code, and use of defaults and English-like language
❖ Typically file-oriented	❖ Typically data base oriented

(v) **Compiler**: A compiler translates the entire program into machine language before the program is executed. Program is entered into the computer system and submitted to the appropriate compiler. For instance, A COBOL program is input to a COBOL compiler; a Pascal program, to a Pascal compiler. The program submitted for compilation is called a Source Program (or source module), which the compiler then translates into machine language, producing an Object Program (or object

module). Then, another software program called a Linkage Editor binds the object module of this program to object modules of any subprograms that must be used to complete processing. The resultant program, which is ready for computer execution, is called a Load program (or load module) that the computer actually executes. Compilers would be preferred in environments where execution speed is important.

Assembler: A program written in assembly language consists of a series of instructions called - mnemonics that correspond to a stream of executable instructions, when translated by an assembler, which can be loaded into memory and executed. A utility program called an assembler is used to translate assembly language statements into the target computer's machine code. The assembler performs a one-to-one mapping from mnemonic statements into machine instructions and data. This is in contrast with high-level languages, in which a single statement generally results in many machine instructions. Assemblers are used exclusively with assembly languages. They work similarly to compilers, translating an assembly language program into object code.

(vi) Replicated Database: In a replicated database, duplicates of data are provided to the sites so that the sites can have frequent access to the same data concurrently. But this method of replication is costly in terms of system resources and also maintaining the consistency of the data elements.

Partitioned Database: In a partitioned database, the database is divided into parts or segments that are required and appropriate for the respective sites so that only those segments are distributed without costly replication of the entire data. A database can be partitioned along functional lines or geographical lines or hierarchically.

(vii) Common Gateway Interface : The Common Gateway Interface (CGI) is used with many Web servers to provide processing beyond the normal HTTP Web interface. CGI requests are submitted from Web browsers to Web servers. When a server receives a CGI request, it typically executes a script to process the request and return a result to the browser.

Transmission Control Protocol: The Transmission Control Protocol (TCP) provides reliable transmission of data in an IP environment. TCP corresponds to the transport layer (Layer 4) of the OSI reference model. Among the services TCP provides are stream data transfer, reliability, efficient flow control, full-duplex operation, and multiplexing.

(viii) DSL Connection: Digital Subscriber Line (DSL) Connection 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 the phone line as a dial-up connection does. 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).

VDSL Connection: Very High Digital Subscriber Line (VDSL) is a Digital Subscriber Line (DSL) technology that offers fast data rates over relatively short distances — the shorter the distance, the faster the connection rate. All types of DSL technologies are collectively referred to as xDSL and its connection speed ranges from 128 Kbps to 8 Mbps.

(ix) **Operational Databases:** These databases store detailed data needed to support the operations of the entire organization. They are also called Subject Area Databases (SADB), Transaction Databases, and Production Databases. Examples are a customer database, personnel database, inventory database, and other databases containing data generated by business operations.

Management Databases: These databases store data and information extracted from selected operational and external database. They consist of summarized data and information most needed by the organization's managers and other end users. Management databases are also called Information databases. These are the databases accessed by executive end-users as part of decision support systems and executive information systems to support managerial decision making.

(x) **Device Drivers:** Device drivers are small files that act as a interface between hardware in a computer system and the operating system (OS). Hardware requires device drivers so that the Operating System can "see" the devices and handle them effectively and efficiently. A driver typically communicates with the device through the computer bus or communications subsystem to which the hardware connects. When a calling program invokes a routine in the driver, the driver issues commands to the device. Once the device sends data back to the driver, the driver may invoke routines in the original calling program. Common components that require drivers include keyboards, mice, controllers, graphics cards, audio hardware, Ethernet hardware, wireless cards, ports, card readers, card slots and CD/DVD drives.

Utility Programs: Utility programs or Service Programs are systems programs that perform general system support tasks. These programs are provided by the computer manufacturers to perform tasks that are common to all data processing installations. Some of them may either be programs in their own right or subordinates to be assembled/compiled in the application programs. Sorting and storing the data; checking or scanning the data stored on hard disk for security reason; making a copy of all information stored on a disk, and restore either the entire disk; performing routine data management tasks, such as deleting, renaming, moving, copying, merging, generating and modifying data sets; providing encryption and decryption of data; analyzing the computer's network connectivity, configure network settings, check data transfer or log events; partitioning of drive into multiple logical drives, each with its own file system which can be mounted by the operating system and treated as an individual drive; converting data from one recording medium to another, viz., floppy disk to hard disc, tape to printer, etc.; dumping of

data to disc or tape and tracing the operation of program are some of the tasks performed by the utility programs.

4.   (a) **Operating System:** An Operating System or Executive system is a program designed to run other programs on a computer. It is system software that acts as an interface between hardware and user. It has two major roles - Resource allocator and Control Program.

It is considered to be the backbone of a computer, managing both software and hardware resources. Operating systems are responsible for everything from the control and allocation of memory to recognizing input from external devices and transmitting output to computer displays. They also manage files on computer hard drives and control peripherals, like printers and scanners. In large computer systems, operating systems monitor different programs and users, making sure everything runs smoothly, without interference, despite the fact that numerous devices and programs are used simultaneously. An operating system also has a vital role to play in security. Its job includes preventing unauthorized users from accessing the computer system.

(b) There are six basic functions that an operating system can perform:

(*i*)   *Schedule Jobs:* They can determine the sequence in which jobs are executed, using priorities established.

(*ii*) *Manage Hardware and Software Resources:* They can first cause the user's application program to be executed by loading it into primary storage and then cause the various hardware units to perform as specified by the application.

(*iii*) *Maintain System Security:* They may require users to enter a password - a group of characters that identifies users as being authorised to have access to the system.

(*iv*) *Enable Multiple User Resource Sharing:* They can handle the scheduling and execution of the application programs for many users at the same time, a feature called multiprogramming.

(*v*)   *Handle Interrupts:* An interrupt is a technique used by the operating system to temporarily suspend the processing of one program in order to allow another program to be executed. Interrupts are issued when a program requests an operation that does not require the CPU, such as input or output, or when the program exceeds some predetermined time limit.

(*vi*) *Maintain Usage Records:* They can keep track of the amount of time used by each user for each system unit - the CPU, secondary storage, and input and output devices. Such information is usually maintained for the purpose of charging users' departments for their use of the organization's computing resources.

5. Expert System: 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. Expert systems typically contain the following components:

    (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 ES 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.

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

    (i)   File volatility: It refers to the number of additions and deletions to the file in a given period of time. The payroll file for a construction company where the employee roster is constantly changing is a highly volatile file. An ISAM file would not be a good choice in this situation, since additions would have to be placed in the overflow area and constant reorganization of the file would have to occur. Other direct access methods would be better. Perhaps even sequential file organization would be appropriate if there were no interrogation requirements.

    (ii) File activity: It is the proportion of master file records that are actually used or accessed in a given processing run. At one extreme is the real-time file where each transaction is processed immediately and hence at a time, only one master record is accessed. This situation obviously requires a direct access method. At the other extreme is a file, such as a payroll master file, where almost every record is accessed when the weekly payroll is processed. There, a sequentially ordered master file would be more efficient.

(iii) **File interrogation**: It refers to the retrieval of information from a file. If the retrieval of individual records must be fast to support a real-time operation such as airline reservation then some kind of direct organization is required. If, on the other hand, requirements for data can be delayed, then all the individual requests or information can be batched and run in a single processing run with a sequential file organization.

(iv) **File size**: Large files that require many individual references to records with immediate response must be organized under some type of direct access method. On the other hand, with small files, it may be more efficient to search the entire file sequentially or, with a more efficient binary search, to find an individual record than to maintain complex indexes or complex direct addressing scheme.

7. (a) **Database Management System**: A Database Management System (DBMS) is a set of software programs that controls the organization, storage, management, and retrieval of data in a database. A data base is a repository for related collection of data. For example, an address book can be a database where the names, address and telephone numbers of friends and business contacts are stored. A company database might contain information about customers, vendors, employees, sales and inventory. Each piece of information can be added to a data base and extracted later in a meaningful way. DBMS is the program (or collection of programs) that allows users (and other programs) to access and work with a database.

(b) **Architecture of a Database Management System**: It follows a three level architecture–

(i)   External or user view,

(ii) Conceptual or global view,

(iii) Physical or internal view.

External or user view encircles the following –

(i)   It is at the highest level of the database abstraction,

(ii) It includes only those portion of database or application programs which is of concern to the users,

(iii) It is described by means of a scheme, called the external schema,

(iv) It is defined by the users or written by the programmers.

For example an external view in its Logical Record 1 may indicate employee name, employee address and in its Logical Record 2 may indicate employee name, employee address and employee code and employee salary.

Global or conceptual view, which is viewed by the Data Base Administrator, encompasses the following –

(i)   All database entities and relationships among them are included,

(ii)   Single view represents the entire database,

(iii) It is defined by the conceptual schema,

(iv)   It describes all records, relationships and constraints or boundaries,

(v)   Data description to render it independent of the physical representation.

For example a conceptual view may define employee code as a string of characters having key value, employee address also as a string, and employee salary as an integer.

The physical or internal view contains the following –

(i)   It is at the lowest level of database abstraction,

(ii)   It is closest to the physical storage method,

(iii) It indicates how data will be stored,

(iv)   It describes data structure,

(v)   It describes access methods,

(vi)   It is expressed by internal schema.

The internal view instead, may define employee name is comprised of 30 characters, employee address is also comprised of 100 characters, employee code is comprised of 5 characters and employee salary is comprised of 10 numbers.
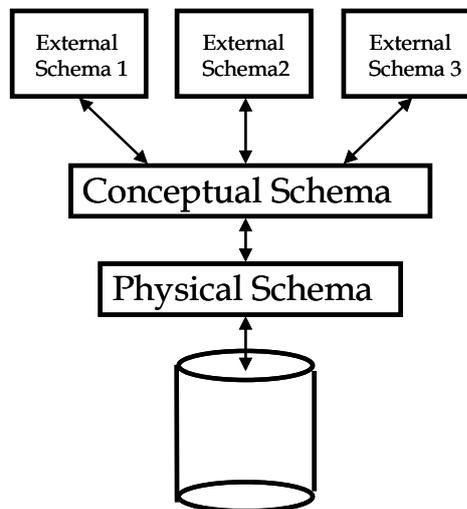

Figure: Three level architecture of a database

8.   (a)   **Data Warehouse**: A Data warehouse is a repository of an organization's electronically stored data. Data warehouses are designed to facilitate reporting and supporting data analysis. Initially, operational systems were unable to meet this need for a range of reasons:

♦   The processing load of reporting reduced the response time of the operational systems,

♦   The database designs of operational systems were not optimized for information analysis and reporting,

♦   Most organizations had more than one operational system, so company-wide reporting could not be supported from a single system, and

♦   Development of reports in operational systems often required writing specific computer programs which was slow and expensive

As a result, separate computer databases specifically designed to support management information and analysis purposes are built. These data warehouses bring in data from a range of different data sources, such as mainframe computers, minicomputers, as well as personal computers and office automation software such as spreadsheets and integrate this information in a single place. This capability, coupled with user-friendly reporting tools, and freedom from operational impacts has led to a growth of this type of computer system.

(b) **Components of a Data warehouse**: The primary components of the majority of data warehouses are described in detail below:

Data Sources: 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 (e.g. daily or weekly) for offline data warehouses.
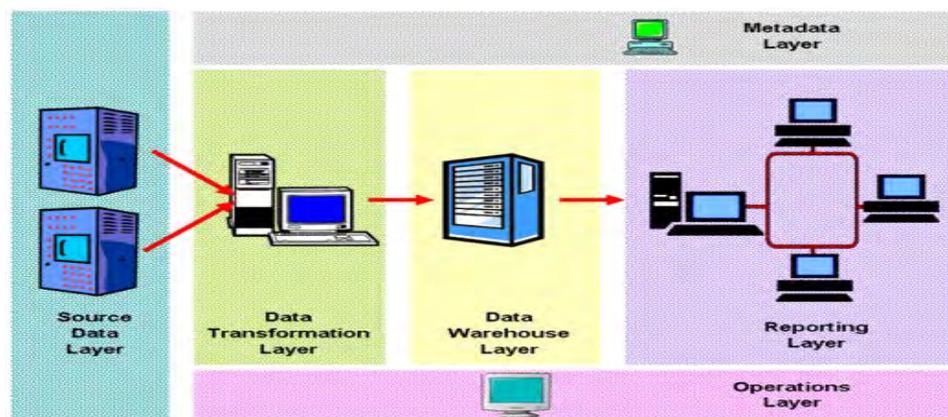

Figure: Components of Data Warehouse

Data Transformation: The Data Transformation layer receives data from the data sources, cleans and standardizes it, and loads it into the data repository. 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. Regardless of the nature of the software used, the following types of activities occur during data transformation:

♦   Comparing data from different systems to improve data quality (e.g. Date of birth for a customer may be blank in one system but contain valid data in a second system. In this instance, the data warehouse would retain the date of birth field from the second system)

♦   standardizing data and codes (e.g. If one system refers to "Male" and "Female", but a second refers to only "M" and "F", these codes sets would need to be standardized)

♦   integrating data from different systems (e.g. if one system keeps orders and another stores customers, these data elements need to be linked)

♦   Performing other system housekeeping functions such as determining change (or "delta") files to reduce data load times, generating or finding surrogate keys for data etc.

Data Warehouse: The data warehouse is a relational database organized to hold information in a structure that best supports reporting and analysis.

Reporting: The data in the data warehouse must be available to the organization's staff if the data warehouse is to be 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.

Metadata: Metadata, or "data about data", is used to inform operators and users of the data warehouse about its status and the information held within the data warehouse. Examples of data warehouse metadata include the most recent data load date, the business meaning of a data item and the number of users that are logged in currently.

Operations: 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.

Optional Components: In addition, the following components also exist in some data warehouses:

(i)   **Dependent Data Marts**: A dependent data mart is a physical database (either on the same hardware as the data warehouse or on a separate hardware platform) that receives all its information from the data warehouse. The purpose of this is to provide a sub-set of the data warehouse's data for a

specific purpose or to a specific sub-group of the organization.

(ii) Logical Data Marts: A logical data mart is a filtered view of the main data warehouse but does not physically exist as a separate data copy. This approach has the additional advantages of not requiring additional (costly) disk space and it is always as current with data as the main data warehouse.

(iii) Operational Data Store: An ODS is an integrated database of operational data. Its sources include legacy systems and it contains current or near term data. An ODS may contain 30 to 60 days of information, while a data warehouse typically contains years of data. ODS's are used in some data warehouse architectures to provide near real time reporting capability in the event that the Data Warehouse's loading time or architecture prevents it being able to provide near real time reporting capability.

9. The geometrical arrangement of computer resources, remote devices, and communication facilities is known as **Network Topology** or **Network Structure**. A computer network is comprised of nodes and links. A **node** is the end point of any branch in a computer, a terminal device, workstation or an interconnecting equipment facility. A link is a communication path between two nodes.

A network structure determines which elements in a computer network can communicate with each other. Four basic network structures and their respective advantages and disadvantages are discussed below.

(i) **Star topology**: The most common structure or topology known as star network is characterized by communication channels emanating from centralized control as shown in Fig. The processing nodes in a star network topology interconnect directly with a central system. Each terminal, small computer or large main frame can communicate only with the central site and not with other nodes in the network. If it is desired to transmit information from one node to another, it can be done only by sending the details to the central node, which in turn sends them to the destination.
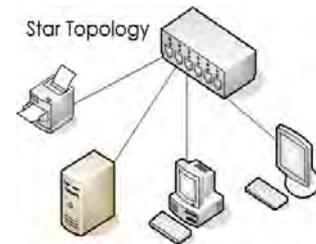

Fig: Star arrangement

A star network is particularly appropriate for organisations that require a centralized data base or a centralized processing facility. For example, a star network may be used in banking for centralized record keeping in an on-line branch office environment.

Advantages:

♦ It is easy to add new nodes and remove existing nodes.

♦ A node failure does not bring down the entire network.

♦ It is easier to diagnose network problems through a central hub.

Disadvantages:

♦   If the central hub fails, the whole network ceases to function.

♦   It costs more to cable a star configuration than other topologies. (more cable is required than for a bus or ring configuration)

(ii)   **Bus topology**: 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 as shown in Fig. Two ends of the cable are terminated with terminators.
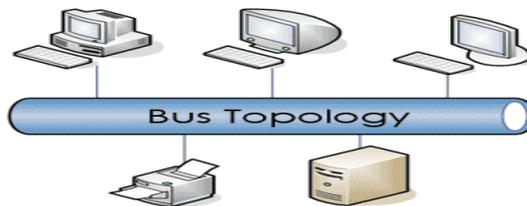
Fig: Bus Topology

Advantages:

♦   Reliable in very small networks as well as easy to use and understand.

♦   Requires the least amount of cable to connect the computers together and therefore is less expensive than other cabling arrangements.

♦   Is easy to extend. Two cables can be easily joined with a connector, making a longer cable for more computers to join the network.

♦   A repeater can also be used to extend a bus configuration.

Disadvantages:

♦   Heavy network traffic can slow a bus considerably because any computer can transmit at any time. But networks do not coordinate when information is sent. Computers interrupting each other can use a lot of bandwidth.

♦   Each connection between two cables weakens the electrical signal.

♦   The bus configuration can be difficult to trouble shoot. A cable break or malfunctioning computer can be difficult to find and can cause the whole network to stop functioning.

(iii)   **Ring topology**: This is yet another structure for local area networks. In this topology, the network cable passes from one node to another until all nodes are connected in the form of a loop or ring. There is a direct point-to-point link between two neighboring nodes. These links are unidirectional which ensures that

transmission by a node traverses the whole ring and comes back to the node, which made the transmission as shown in Fig.
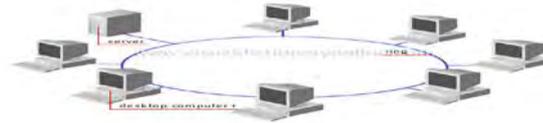

Fig: Ring topology

Advantages:

♦   Ring networks offer high performance for a small number of workstations or for larger networks where each station has a similar workload.

♦   Ring networks can span longer distances than other types of networks.

♦   Ring networks are easily extendable.

Disadvantages:

♦   Relatively expensive and difficult to install.

♦   Failure of one computer on the network can affect the whole network.

♦   It is difficult to trouble shoot a ring network.

♦   Adding or removing computers can disrupt the network

(iv)   **Mesh topology**: In this structure, there is random connection of nodes using communication links. These network lines are expensive to install and maintain. Therefore, links are planned very carefully to minimize cost and maintain reliable and efficient traffic movement. A mesh network may be fully connected as shown in Fig. or connected with only partial links. In fully interconnected topology, each node is connected by a dedicated point to point link to every node. This means that there is no need of any routing function as nodes are directly connected. The reliability is very high as there are always alternate paths available if direct link between two nodes is down or dysfunctional. Fully connected networks are not very common because of the high cost. Only military installations, which need high degree of redundancy, may have such networks, that too with a small number of nodes.
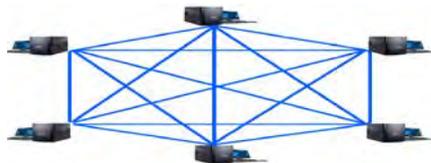

Fig: Mesh topology

Advantages:

♦ Yields the greatest amount of redundancy in the event that one of the nodes fails where network traffic can be redirected to another node.

♦ Network problems are easier to diagnose.

Disadvantages:

♦ The cost of installation and maintenance is high (more cable is required than any other configuration)

♦ For any network to exist there must be connections between computers and agreements or what is termed as protocols about the communications language. Setting up connections and agreements between dispersed computers (from PCs to mainframes) is complicated being heterogeneous in their software and hardware, as well as their intended functionality.

10. **Transmission Technologies:** A given transmission on a communications channel between two machines can occur in several different ways. The transmission is characterized by:

• the direction of the exchanges – **Simplex, Half-duplex and Full-duplex**

• the transmission mode: the number of bits sent simultaneously – **Serial and Parallel Transmission**

• synchronization between the transmitter and receiver – **Asynchronous and Synchronous Transmission**

(i) **Simplex, Half-duplex and Full-duplex Connections:** There are three different transmission modes characterized according to the direction of the exchanges:

♦ **Simplex Connection:** A simplex connection is a connection in which the data flows in only one direction, from the transmitter to the receiver. Simplex mode is seldom used because a return path is generally needed to send acknowledgements, control or error signals. This type of connection is useful if the data do not need to flow in both directions (for example, from your computer to the printer or from the mouse to your computer.).

♦ **Half-duplex Connection:** A half-duplex connection is a connection in which the data flows in one direction or the other, but not both at the same time. With this type of connection, each end of the connection transmits in turn. This type of connection makes it possible to have bidirectional communications using the full capacity of the line. For example: Walkie Talkie.

♦ **Full-Duplex Connection:** A Full-duplex connection is a connection in which the data flow in both directions simultaneously. Each end of the line can thus transmit and receive at the same time, which means that the bandwidth is divided in two for each direction of data transmission if the same transmission

medium is used for both directions of transmission. For example, mobile phones

(ii) **Serial and Parallel Transmission:** These are two different transmission modes characterized according to the the number of bits sent simultaneously.

♦ **Serial Transmission:** In serial transmission, the bits of each byte are sent along a single path one after another as illustrated in Fig.
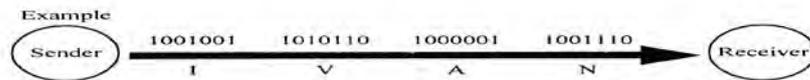

Fig: Serial Transmission

♦ **Parallel Transmission:** In parallel transmission, there are separate, parallel path corresponding to each bit of the byte so that all character bits are transmitted simultaneously as shown in Fig.
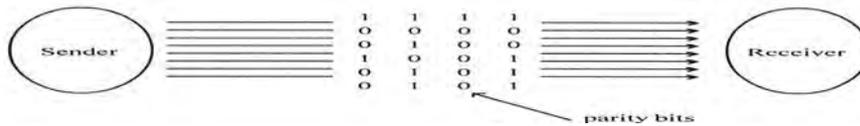

Fig: Parallel Transmission

(iii) **Synchronous and Asynchronous Transmission:** These are two different transmission modes characterized according to the synchronization between the transmitter and receiver.

♦ **Asynchronous Transmission:** In this, each character is sent at irregular intervals in time as in the case of characters entered at the keyboard in real time. For example, if a single bit is transmitted during a long period of silence, the receiver will not be able to know if this is 00010000, 10000000 or 00000100. To correct this problem, each character is preceded by some information indicating the start of character transmission by Start-of-Transmission information (called a START bit usually 0) and ends by sending end-of-transmission information (called STOP bit usually 1), as shown in Fig.
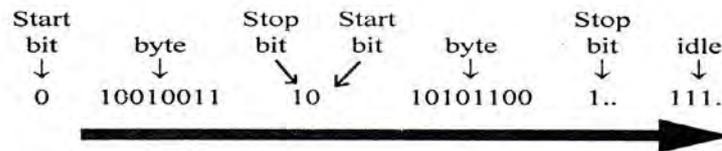

Fig: Asynchronous Transmission

♦ **Synchronous Transmission:** In this, the transmitter and receiver are paced by the same clock. The receiver continuously receives (even when no bits are

transmitted) the information at the same rate the transmitter sends it. This is why the transmitter and receiver are paced at the same speed. In addition, supplementary information is inserted to guarantee that there are no errors during transmission, as shown in Fig.

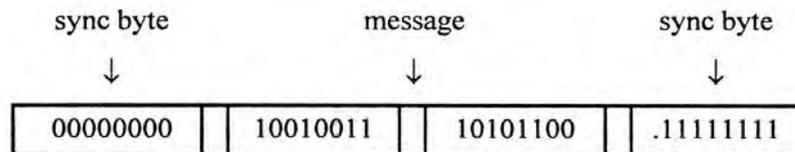| sync byte	message		sync byte
↓	↓		↓
00000000	10010011	10101100	.11111111

Fig: Synchronous Transmission

During synchronous transmission, the bits are sent successively with no separation between each character, so it is necessary to insert synchronization elements. A group of synchronization bits must be placed at the beginning and ending of each block to maintain synchronization.

11. **Open System Interconnection Model (OSI Model):** OSI Model has been outlined by International Organization for Standardization (ISO) to facilitate communication of heterogeneous hardware or software platforms with each other. It is an abstract description for layered communications and computer network protocol design. It was developed as part of the Open Systems Interconnection (OSI) initiative. In its most basic form, it divides network architecture into seven layers, wherein a layer is a collection of layers which, from top to bottom, are the **Application, Presentation, Session, Transport, Network, Data-Link, and Physical Layers.** It is therefore often referred to as the **OSI Seven Layer Model.** A layer is a collection of conceptually similar functions that provide services to the layer above it and receives services from the layer below it. The description of each OSI layers is discussed below.

Layer 7 or Application Layer: The application layer of OSI layer architecture is closest to the end user, which means that both the OSI application layer and the user interact directly with the software application. This layer interacts with software applications and provides user services by file transfer, file sharing, etc. This is the layer at which communication partners are identified, quality of service is identified, user authentication and privacy are considered, and any constraints on data syntax are identified.

Layer 6 or Presentation Layer: This layer at times referred as **Syntax Layer** also, is usually a part of an operating system, that converts incoming and outgoing data from one presentation format to another (for example, from a text stream into a popup window with the newly arrived text). It further controls on screen display of data, transforms data to a standard application interface. Encryption, data compression can also be undertaken at this layer level.

Layer 5 or Session Layer: This layer sets up, coordinates, and terminates conversations, exchanges, and dialogs between the applications at each end. It deals with session and connection coordination. It provides for full-duplex, half-duplex, or

simplex operation, and establishes check pointing, adjournment, termination, and restart procedures.

Layer 4 or Transport Layer: This layer also ensures reliable and transparent transfer of data between user processes, assembles and disassembles message packets, and provides error recovery and flow control. Multiplexing and encryption are undertaken at this layer level. This means that the Transport Layer can keep track of the segments and retransmit those that fail.

Layer 3 or Network Layer: The Network Layer provides the functional and procedural means of transferring variable length data sequences from a source to a destination via one or more networks, while maintaining the quality of service requested by the Transport Layer. The Network Layer makes a choice of the physical route of transmission, creates a virtual circuit for upper layers to make them independent of data transmission and switching, establishes, maintains, terminates connections between the nodes and ensure proper routing of data.

Layer 2 or Data Link Layer: The Data Link Layer responds to service requests from the Network Layer and issues service requests to the Physical Layer. The Data Link Layer is the protocol layer which transfers data between adjacent network nodes in a wide area network or between nodes on the same local area network segment.

This layer is also a hardware layer which specifies channel access control method and ensures reliable transfer of data through the transmission medium. It provides the functional and procedural means to transfer data between network entities and to detect and possibly correct errors that may occur in the Physical Layer.

Layer 1 or Physical Layer: The Physical Layer is a hardware layer which specifies mechanical features as well as electromagnetic features of the connection between the devices and the transmission. In particular, it defines the relationship between a device and a physical medium. This includes the layout of pins, voltages, cable specifications, Hubs, repeaters, network adapters, Host Bus Adapters (HBAs used in Storage Area Networks) and more. The major functions and services performed by the Physical Layer are:

- Establishment and termination of a connection to a communications medium.

- Participation in the process whereby the communication resources are effectively shared among multiple users. For example, contention resolution and flow control.

- Modulation or conversion between the representation of digital data in user equipment and the corresponding signals transmitted over a communications channel. These are signals operating over the physical cabling (such as copper and optical fiber) or over a radio link.

12. **Components of a LAN are as follows:**

A typical Local Area Network (LAN) running under Novell NetWare has five basic components that make up the network. These are as follows:

- File Server
- Network Operating System
- Personal Computers, Workstations or Nodes
- Network Interface Cards
- Network Cabling

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

(ii) **The Network Operating System** - It is loaded into the server's hard disk along with the system management tools and user utilities. When the system is restarted, NetWare boots and the server command its control. No processing is done on the server, and hence it is called a Passive Device. The larger the network, the more important it becomes to have a high performance server. Larger amounts of RAM are required to support disk caches and printer queues (which are created due to sharing of same hard disk and printers by number of nodes on the network).

(iii) **Workstations** - Workstations are normally intelligent systems that are attached to the server through the network interface card and the cabling. The concept of distributed processing relies on the fact that personal computers attached to the networks perform their own processing after loading programs and data from the server. Hence, a workstation is called an Active Device on the network. After processing, files are stored back on the server where they can be used by other workstations.

(iv) **Network Interface Card (NIC)** - Every device connected to a LAN needs a Network interface card (NIC) to plug into the LAN. For example, a PC may have an Ethernet card installed in it to connect to an Ethernet LAN.

(v) **Network Cabling** - Once the server, workstations and network interface cards are in place, network cabling is used to connect everything together. The most popular type of network cable is the shielded twisted-pair, co-axial and fibre optic cables.

13. **Internet Protocol Suite**: The Internet protocol suite is the set of communications protocols that implement the protocol stack on which the Internet and most commercial networks run. It is sometimes called the TCP/IP protocol suite, after the two most important protocols in it: the Transmission Control Protocol (TCP) and the Internet Protocol (IP), which were also the first two defined.

The Internet protocol suite — like many protocol suites — can be viewed as a set of layers; each layer solves a set of problems involving the transmission of data, and

provides a well-defined service to the upper layer protocols based on using services from some lower layers. Upper layers are logically closer to the user and deal with more abstract data, relying on lower layer protocols to translate data into forms that can eventually be physically transmitted.

The OSI model describes a fixed, seven layer stack for networking protocols. Comparisons between the OSI model and TCP/IP can give further insight into the significance of the components of the IP suite, but can also cause confusion, as TCP/IP consists of only 4 layers. Some of the aforementioned protocols are detailed as below:

Layer	TCP / IP Protocols
Application	DNS, TLS/SSL, TFTP, FTP, HTTP, IMAP, IRC, NNTP, POP3, SIP, SMTP, SNMP, SSH, TELNET, BitTorrent, RTP, rlogin, …
Transport	TCP, UDP, DCCP, SCTP, IL, RUDP, …
Network	IP (IPv4, IPv6), ICMP, IGMP, ARP, RARP, …
Link	Ethernet, Wi-Fi, Token ring, PPP, SLIP, FDDI, ATM, DTM, Frame Relay, SMDS

14. The different dimensions of E-commerce security are as follows:

- **Integrity** - The ability to ensure that information being displayed on a web site or transmitted or received over the internet has not been altered in any way by an unauthorized party.

- **Non-repudiation** - The ability to ensure that e-commerce participants do not deny (i.e. repudiate) their online actions.

- **Authenticity** - The ability to identify the identity of a person or entity with whom we are dealing in the internet.

- **Confidentiality** - The ability to ensure that messages and data are available only to those who are authorized to view them.

- **Privacy** - The ability to control the use of information about oneself.

- **Availability** - The ability to ensure that an e-commerce site continues to function as intended.

Furthermore, a number of additional concerns about initiating electronic commerce on the Internet must be addressed before these businesses are ready to take the "electronic plunge:

- **Reliability** - The availability of the service level that the company depends upon to conduct business anytime.

- **Scalability** – The ability to scale the Internet and individual services in order to meet the needs and expectations of all businesses.

- **Ease of use** – The methods to be developed to promote easy access and use to all potential trading partners. Will small businesses be at a disadvantage due to a lack of technical sophistication and resources?

- **Payment methods** – The evolving of an appropriate, safe, and reliable payment method for electronic commerce.

15. The required flowchart is drawn below in Fig.
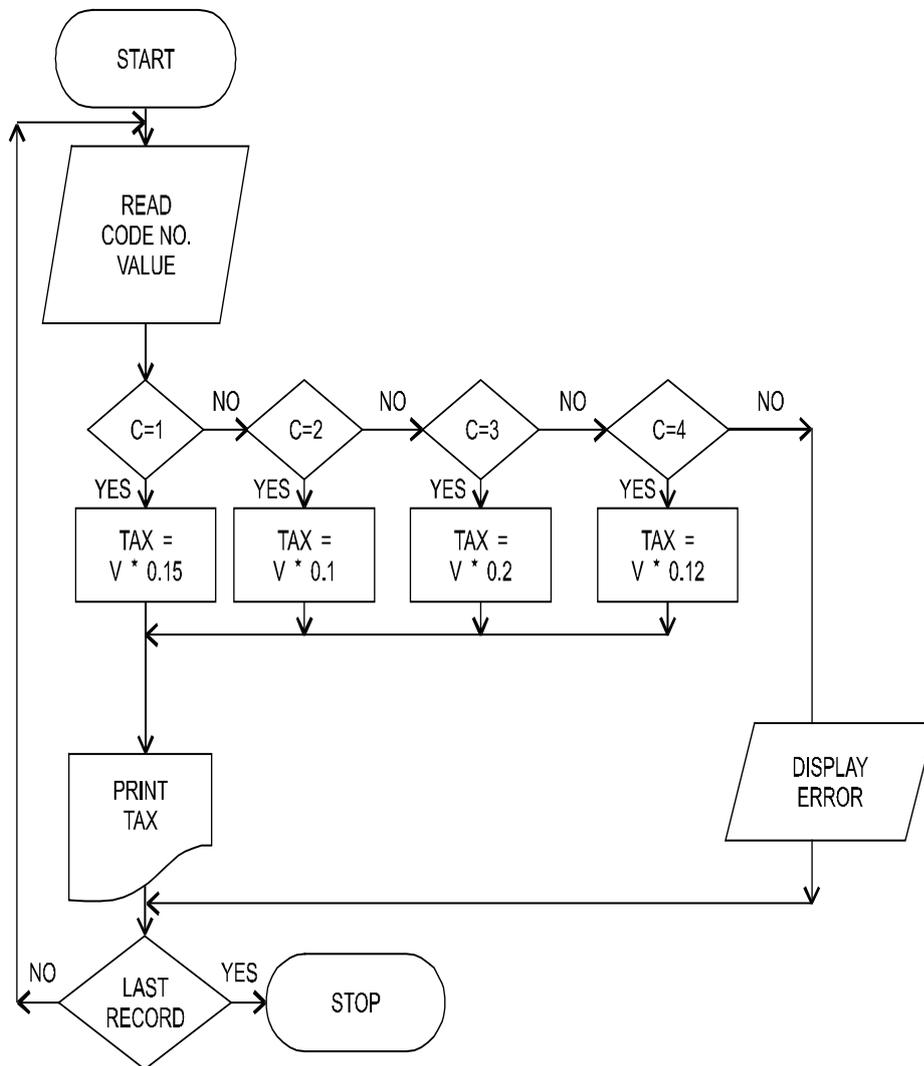
SECTION – B: STRATEGIC MANAGEMENT

QUESTIONS

Correct/Incorrect with reasoning

1. State with reasons which of the following statements are correct/incorrect:

    (a) Enterprises pursue multiple objectives rather than a single objective.

    (b) The role of corporate-level managers is to oversee the development of strategies for the whole organization.

    (c) Key Success Factors (KSFs) are static in industries.

    (d) Differentiation guarantees competitive advantage.

    (e) Strategic planning gives direction to the organization.

    (f) The management of funds can play a pivotal role in strategy implementation.

    (g) Liquidation strategy may be a pleasant strategic alternative.

    (h) SBU concepts facilitate multi business operations.

    (i) BPR is an approach to maintain the existing growth of an organization.

    (j) TQM is a people focused management system.

Explain the concepts

2. Explain the meaning of the following concepts:

    (a) Global environment

    (b) Strategic analysis

    (c) Market penetration

    (d) Cost leadership

Differences between the two concepts

3. Distinguish between the following:

    (a) Forward integration and backward integration

    (b) Vision and mission

    (c) Inbound logistics and outbound logistics

    (d) DMAIC and DMADV

Short notes

4. Write short notes on the following:

    (a) Strategic surveillance

    (b)   Competitive environment

    (c)   Strategic decision making

    (d)   Retrenchment strategy

Brief answers

5.   Briefly answer the following questions:

    (a)   Under what conditions a turnaround strategy can be used in an organization?

    (b)   What are strategic groups?

    (c)   Components of a value chain

    (d)   Elements considered for situational analysis

Chapter 1-Business Environment

6.   Briefly explain macro environmental factors that affect an organization's strategy.

7.   Explain the strategic responses that can be opt in a particular situation by an organization during the environmental changes.

Chapter 2-Business Policy and Strategic Management

8.   Explain in brief the level of strategic management in an organization.

9.   What are the major dimensions of strategic decision making?

Chapter 3-Strategic Analysis

10.   How an organization analyses its business portfolio explain on market growth rate and relative market share.

11.   Discuss various issues in analysis of competition in an industry?

Chapter 4-Strategic Planning

12.   Devise an ideal work plan for implementing a turnaround strategy in an organization?

13.   Briefly explain the steps involved in formulating the corporate strategy.

Chapter 5-Formulation of Functional Strategy

14.   Discuss the important areas where human resource manager can play a strategic role.

15.   "Evaluating the worth of a business is central to strategy implementation." In the light of this statement, explain the methods that can be used for determining the worth of a business.

Chapter 6-Strategic Implementation and Control

16.   How a corporate culture can be a strength and weakness of an organization?

17. Transformational leadership style may be appropriate in turbulent environment while transactional leadership style may be appropriate in settled environment. Comment.

Chapter 7-Reaching Strategic Edge

18. Explain in brief the themes of Six Sigma.

19. Compare the Traditional Management Practices with Total Quality Management (TQM).

SUGGESTED ANSWERS / HINTS

1. (a) **Correct**: Enterprises pursues multiple objectives rather than a single objective. In general, we may identify a set of business objectives pursued by a large cross-section of enterprises. These relate to profitability, productive efficiency, growth, technological dynamism, stability, self-reliance, survival, competitive strength, customer service, financial solvency, product quality, diversification, employee satisfaction and welfare, and so on. Enterprises seek to balance these objectives in some appropriate manner.

    (b) **Correct**: The role of corporate-level managers is to oversee the development of strategies for the whole organization. This role includes defining the mission and goals of the organization, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organization.

    (c) **Incorrect**: Key success factors vary from industry to industry and even from time to time within the same industry as driving forces and competitive conditions change. Only rarely does an industry have more than three or four key success factors at any one time. And even among these three or four, one or two usually outrank the others in importance.

    (d) **Incorrect**: Different strategies offer different degrees of differentiation. Differentiation does not guarantee competitive advantage, especially if standard products sufficiently meet customer needs or if rapid imitation by competitors is possible. Durable products protected by barriers to quick copying by competitors are best. Successful differentiation can mean greater product flexibility, greater compatibility, lower costs, improved service, less maintenance, greater convenience, or more features. Product development is an example of a strategy that offers the advantages of differentiation.

    (e) **Correct**: Strategic planning is process of determining organizational strategy. It gives direction to the organization and involves making decisions and allocating resources to pursue the strategy. It is the formal consideration of future course of an organization. It determines where an organization is going over the next year or more and the ways for going there.

(f) Correct: The management of funds can play a pivotal role in strategy implementation as it aims at the conservation and optimum utilization of funds objectives which are central to any strategic action. Organizations that implement strategies of stability, growth or retrenchment cannot escape the rigours of a proper management of funds. In fact, good management of funds often creates the difference between a strategically successful and unsuccessful company.

(g) Incorrect: Liquidation strategy may be unpleasant as a strategic alternative but when a "dead business is worth more than alive", it is a good proposition. For instance, the real estate owned by a firm may fetch it more money than the actual returns of doing business. When liquidation is evident (though it is difficult to say exactly when), an abandonment plan is desirable. Planned liquidation would involve a systematic plan to reap the maximum benefits for the firm and its shareholders through the process of liquidation.

(h) Correct: Organizing business along SBU lines and creating strategic business units has become a common practice for multi-product/service and global organizations. It is a convenient and intelligent grouping of activities along distinct businesses and has replaced the conventional groupings. SBU facilitates strategic planning, gaining product-related/market-related specialization, gaining cost-economies and more rational organizational structure.

(i) Incorrect: BPR is an approach to unusual enhancement in operating effectiveness through the redesigning of critical business processes and supporting business systems. It is revolutionary redesign of key business processes that involve examination of the basic processes.

(j) Correct: TQM or Total Quality Management is a people-focused management system that aims at continual increase in customer satisfaction at continually lower real cost. There is a sustained management commitment to quality and everyone in the organisation and the supply chain is responsible for preventing rather than detecting defects.

2. (a) In simple economic terms, globalization refers to the process of integration of the world into one huge market. At the company level, globalization means two things: (a) the company commits itself heavily with several manufacturing locations around the world and offers products in several diversified industries, and (b) it also means ability to compete in domestic markets with foreign competitors.

(b) Judgments about what strategy to pursue need to flow directly from solid analysis of a company's external environment and internal situation. The two most important situational considerations are (1) industry and competitive conditions and (2) a company's own competitive capabilities, resources, internal strengths and weaknesses, and market position.

(c) **Market Penetration:** The most common expansion strategy is market penetration/concentration on the current business. The firm directs its resources to the profitable growth of a single product, in a single market, and with a single technology.

(d) **Cost leadership** emphasizes producing standardized products at a very low per-unit cost for consumers who are price-sensitive. It frequently results from productivity increases and aggressive pursuit of cost reduction throughout the development, production, marketing, and distribution processes. It allows a firm to earn higher profits than its competitors.

3. (a) Forward and backward integration forms part of vertically integrated diversification. In vertically integrated diversification, firms opt to engage in businesses that are vertically related to the existing business of the firm. The firm remains vertically within the same process. While diversifying firms opt to engage in businesses that are linked forward or backward in the chain and enters specific product/process steps with the intention of making them into new businesses for the firm.

   Backward integration is a step towards, creation of effective supply by entering business of input providers. Strategy employed to expand profits and gain greater control over production of a product whereby a company will purchase or build a business that will increase its own supply capability or lessen its cost of production. On the other hand forward integration is moving forward in the value chain and entering business lines that use existing products. Forward integration will also take place where organisations enter into businesses of distribution channels.

   (b) The vision describes a future identity while the Mission serves as an ongoing and time-independent guide.

   The vision statement can galvanize the people to achieve defined objectives, even if they are stretch objectives, provided the vision is specific, measurable, achievable, relevant and time bound. A mission statement provides a path to realize the vision in line with its values. These statements have a direct bearing on the bottom line and success of the organization.

   A mission statement defines the purpose or broader goal for being in existence or in the business and can remain the same for decades if crafted well while a vision statement is more specific in terms of both the future state and the time frame. Vision describes what will be achieved if the organization is successful.

   (c) Inbound logistics are the activities concerned with receiving, storing and distributing the inputs to the product/service. It includes all activities such as materials handling, stock control, transport etc.

   Outbound logistics relate to collection, storage and distribution of the product to customers. It includes all activities such as storage/warehousing of finished goods, order processing, scheduling deliveries, operation of delivery vehicles, etc.

(d) For implementing six sigma, there are two separate key methodologies for existing and new processes. They are known as DMAIC and DMADV.

DMAIC is an acronym for five different steps used in six sigma - Define, Measure, Analyze Improve, and control. DMAIC methodology is directed towards improvement of existing product, process or service.

♦ Define: To begin with six sigma experts define the process improvement goals that are consistent with the strategy of the organization and customer demands. They discuss different issues with the senior managers so as to define what needs to done.

♦ Measure: The existing processes are measured to facilitate future comparison. Six sigma experts collect process data by mapping and measuring relevant processes.

♦ Analyze: Verify cause-and-effect relationship between the factors in the processes. Experts need to identify the relationship between the factors. They have to make a comprehensive analysis to identify hidden or not so obvious factor.

♦ Improve: On the basis of the analysis experts make a detailed plan to improve.

♦ Control: Initial trial or pilots are run to establish process capability and transition to production. Afterwards continuously measure the process to ensure that variances are identified and corrected before they result in defects.

DMADV is an acronym for Define, Measure, Analyze, Design, and Verify. DMADV is a strategy for designing new products, processes and services.

♦ Define: As in case of DMAIC six sigma experts have to formally define goals of the design activity that are consistent with strategy of the organization and the demands of the customer.

♦ Measure: Next identify the factors that are critical to quality (CTQs). Measure factors such as product capabilities and production process capability. Also assess the risks involved.

♦ Analyze: Develop and design alternatives. Create high-level design and evaluate to select the best design.

♦ Design: Develop details of design and optimise it. Verify designs may require using techniques such as simulations.

♦ Verify: Verify designs through simulations or pilot runs. Verified and implemented processes are handed over to the process owners.

However, in spite of different orientation in two methodologies, conceptually there is overlapping between the DMAIC and DMADV as both are essentially having similar objectives.

4. (a) **Strategic surveillance:** Contrary to the premise control, the strategic surveillance is unfocussed. It involves general monitoring of various sources of information to uncover unanticipated information having a bearing on the organizational strategy. It involves casual environmental browsing. Reading financial and other newspapers, business magazines, meetings, conferences, discussions at clubs or parties and so on can help in strategic surveillance.

Strategic surveillance may be loose form of strategic control, but is capable of uncovering information relevant to the strategy.

(b) The nature and extent of competition that a business is facing in the market is one of the major factors affecting the rate of growth, income distribution and consumer welfare. Businesses have to consider competitors' strategies, profits levels, costs, products and services when preparing and implementing their own business plans. While formulating strategies, organizations have to separately identify and concentrate on the competitors who are significantly affecting the business.

Cooperation in a Competitive Environment: Some organizations within the same industry may form cartels. Organizations instead of competing may join together to decide explicit or tacit arrangements not known to general public. Cooperation may also be witnessed in highly competitive business environment. The benefits of cooperation also seen in Japan, where large cooperative networks of businesses are known as kieretsu. These are formed in order to enhance the abilities of individual member businesses to compete in their respective industries. A kieretsu is a loosely-coupled group of companies, usually in related industries.

Cooperation on account of family ownership: Theoretically, cooperation generates automatically in businesses owned by a same family. However, several times internal strife and feuds creates problems for the business.

(c) Decision making is a managerial process and function of choosing a particular course of action out of several alternative courses for the purpose of accomplishment of the organizational goals. Decisions are routine, tactical or strategic in nature. Strategic decisions are different from other decisions that are taken at various levels of the organization during day-to-day working of the organizations. They have long term implications, steer organisation to its future path, and have organisation wide implications and so on. These decisions are taken considering different internal and external factors. They are also taken with partial or no definite knowledge of different factors affecting the decision situation.

(d) Retrenchment strategy implies substantial reduction in the scope of organization's activity. A business organization can redefine its business by divesting a major

product line or market. While retrenching organizations might set objectives below the past level of objectives. It is essentially a defensive strategy adopted as a reaction to operating problems stemming from either internal mismanagement, unanticipated actions by competitors or hostile and unfavourable changes in the business environmental conditions. With a retrenchment strategy the endeavour of management is to raise the level of enterprise achievements focusing on improvements in the functional performance and cutting down operations with negative cash flows.

5. (a) When firms are losing their grips over market, profits due to several internal and external factors, and if they have to survive under the competitive environment they have to identify danger signals as early as possible and undertake rectification steps immediately. These conditions may be, inter alia cash flow problems, lower profit margins, high employee turnover and decline in market share, capacity underutilization, low morale of employees, recessionary conditions, mismanagement, raw material supply problems and so on.

(b) 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.

(c) Value chain refers to separate activities which are necessary to underpin an organization's strategies and are linked together both inside and outside the organization. Organizations are much more than a random collection of machines, money and people. Value chain of a manufacturing organization comprises of primary and supportive activities. The primary ones are inclusive of inbound logistics, operations, outbound logistics, marketing and sales, and services. The supportive activities relate to procurement, human resource management, technology development and infrastructure.

Value chain analysis helps in maintaining the long-term competitive position of an organization to sustain value for-money in its products or service. It can be helpful in identifying those activities which the organization must undertake at a threshold level of competence and those which represent the core competences of the organization.

(d) The elements considered for situational analysis are as follows:

♦ *Environmental factors:* What external and internal environmental factors are there that needs to be taken into account. This can include economic, political, demographic or sociological factors that have a bearing on the performance.

♦ *Opportunity and issue analysis:* What are the current opportunities that are available in the market, the main threats that business is facing and may face in the future, the strengths that the business can rely on and any weaknesses that may affect the business performance.

♦ *Competitive situation:* Analyze main competitors of organisation: Who are they, what they up to are, how they compare. What are their competitive advantages?

♦ *Distribution situation:* Review the distribution situation - how are the products moving through channels.

♦ *Product situation:* The details about current product. The details about current product may be divided into parts such as the core product and any secondary or supporting services or products that also make up what you sell. It is important to observe this in terms of its different parts in order to be able to relate this back to core client needs.

6. Macro environment is explained as one which is largely external to the enterprise and thus beyond the direct influence and control of the organization, but which exerts powerful influence over its functioning. Important elements of macro environment are:

• **Demographic Environment:** The term demographics denote characteristics of population in an area, district, country or in world. Some of the demographic factors have great impact on the business. Factors such as general age profile, sex ratio, income, education, growth rate affect the business with different magnitude.

• **Economic Environment:** The economic environment refers to the nature and direction of the economy in which a company competes or may compete. The economic environment includes general economic situation in the region and the nation, conditions in resource markets (money, manpower, raw material and so on) which influence the supply of inputs to the enterprise, their costs, quality, availability and reliability of supplies.

• **Political-Legal Environment:** There are three important elements in political-legal environment:

• **Government:** Business is highly guided and controlled by government policies. Hence the type of government running a country is a powerful influence on business:

• **Legal:** Business organizations prefer to operate within a sound legal system. Legal environment consists of laws governing business.

- **Political**: Political pressure groups influence and limit organizations. Apart from sporadic movements against certain products, service and organizations, politics has deeply seeped into unions.

- **Socio-Cultural Environment**: Socio-cultural environment consist of factors related to human relationships and the impact of social attitudes and cultural values which has bearing on the business of the organization. The beliefs, values and norms of a society determine how individuals and organizations should be interrelated.

- **Technological Environment**: Technology can act as both opportunity and threat to a business. It can act as opportunity as business can take advantage of adopting technological innovations to their strategic advantage. However, at the same time technology can act as threat if organisations are not able to adopt it to their advantage.

- **Global Environment**: In simple economic terms, globalization refers to the process of integration of the world into one huge market. At the company level, globalization means two things: (a) the company commits itself heavily with several manufacturing locations around the world and offers products in several diversified industries, and (b) it also means ability to compete in domestic markets with foreign competitors.

7. The business organization and its many environments have innumerous interrelationship that at times, it becomes difficult to determine exactly where the organization ends and where its environment begins. It is also difficult to determine exactly what business should do in response to a particular situation in the environment. Strategically, the businesses should make efforts to exploit the opportunity ad thought the threats.

In this context following approaches may be noted:

(i) **Least resistance**: Some businesses just manage to survive by way of coping with their changing external environments. They are simple goal-maintaining units. They are very passive in their behaviour and are solely guided by the signals of the external environment. They are not ambitious but are content with taking simple paths of least resistance in their goal-seeking and resource transforming behaviour.

(ii) **Proceed with caution**: At the next level, are the businesses that take an intelligent interest to adapt with the changing external environment. They seek to monitor the changes in that environment, analyse their impact on their own goals and activities and translate their assessment in terms of specific strategies for survival, stability and strength. They regard that the pervasive complexity and turbulence of the external environmental elements as 'given' within the framework of which they have to function as adaptive-organic sub-systems. This is an admittedly sophisticated strategy than to wait for changes to occur and then take corrective-adaptive action.

(iii) **Dynamic response**: At a still higher sophisticated level, are those businesses that regard the external environmental forces as partially manageable and controllable

by their actions. Their feedback systems are highly dynamic and powerful. They not merely recognise and ward off threats; they convert threats into opportunities. They are highly conscious and confident of their own strengths and the weaknesses of their external environmental 'adversaries'. They generate a contingent set of alternative courses of action to be picked up in tune with the changing environment.

8.   A typical large organization is a multidivisional organisation that competes in several different businesses. It has separate self-contained divisions to manage each of these. There are three main levels of management: corporate, business, and functional. General managers are found at the first two of these levels, but their strategic roles differ depending on their sphere of responsibility.
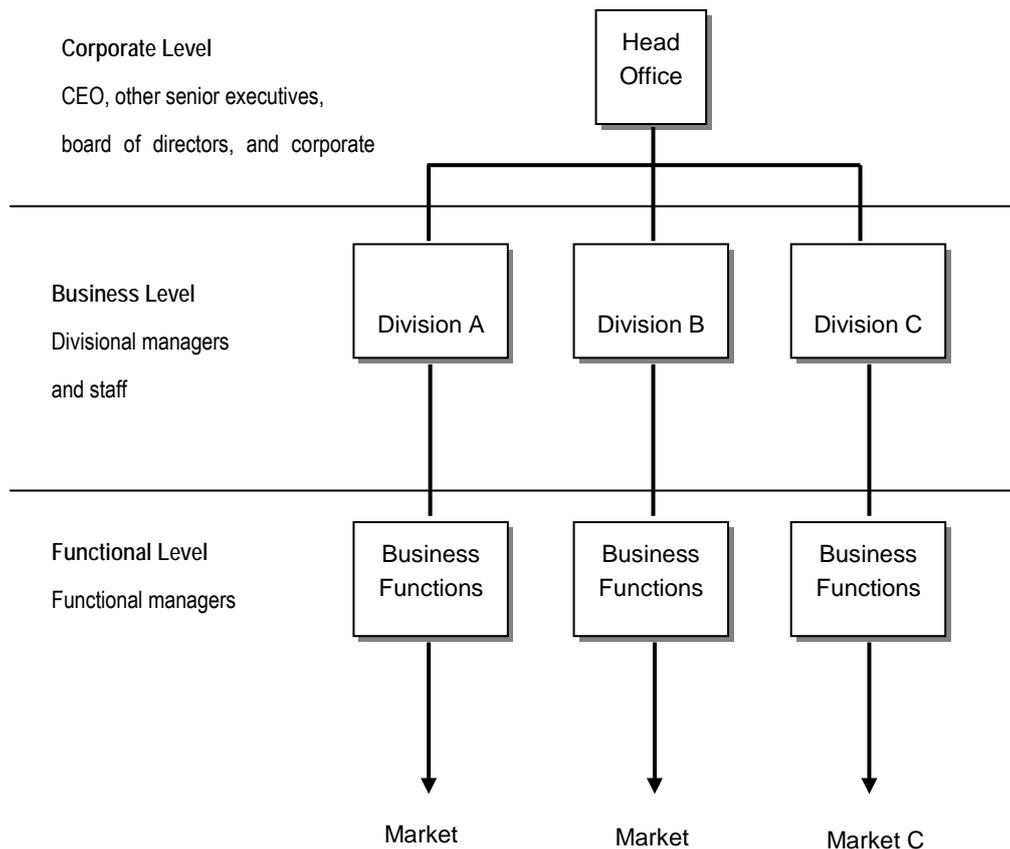

Figure : Level of Strategic Management

An organization is divided into several functions and departments that work together to bring a particular product or service to the market. If a company provides several different kinds of products or services, it often duplicates these functions and creates a series of self-contained divisions (each of which contain its own set of functions) to

manage each different product or service. The general managers of these divisions then become responsible for their particular product line. The overriding concern of general managers is for the health of the whole company or division under their direction; they are responsible for deciding how to create a competitive advantage and achieve high profitability with the resources and capital they have at their disposal.

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the apex of decision making within the organization. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organization. This role includes defining the mission and goals of the organization, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organization.

It is not his specific responsibility to develop strategies for competing in the individual business areas, such as financial services. The development of such strategies is the responsibility of the general managers in these different businesses or business level managers.

Besides overseeing resource allocation and managing the divestment and acquisition processes, corporate-level managers provide a link between the people who oversee the strategic development of a firm and those who own it (the shareholders). Corporate-level managers, and particularly the CEO, can be viewed as the guardians of shareholder welfare. It is their responsibility to ensure that the corporate and business strategies that the company pursues are consistent with maximizing shareholder wealth. If they are not, then ultimately the CEO is likely to be called to account by the shareholders.

A business unit is a self-contained division (with its own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. The principal general manager at the business level, or the business-level manager, is the head of the division. The strategic role of these managers is to translate the general statements of direction and intent that come from the corporate level into concrete strategies for individual businesses. Thus, whereas corporate-level general managers are concerned with strategies that span individual businesses, business-level general managers are concerned with strategies that are specific to a particular business.

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of its divisions. Thus, a functional manager's sphere of responsibility is generally confined to one organizational activity, whereas general managers oversee the operation of a whole company or division. Although they are not responsible for the overall performance of the organization, functional managers

nevertheless have a major strategic role: to develop functional strategies in their area that help fulfil the strategic objectives set by business- and corporate-level general managers.

Functional managers provide most of the information that makes it possible for business- and corporate-level general managers to, formulate realistic and attainable strategies. Indeed, because they are closer to the customer than the typical general manager is, functional managers themselves may generate important ideas that subsequently may become major strategies for the company. Thus, it is important for general managers to listen closely to the ideas of their functional managers. An equally great responsibility for managers at the operational level is strategy implementation: the execution of corporate - and business-level plans.

9. Strategic decisions are different in nature than all other decisions which are taken at various levels of the organization during day-to-day working of the organizations. The major dimensions of strategic decisions are given below:

   - *Strategic issues require top-management decisions*: Strategic issues involve thinking in totality of the organizations and also there is lot of risk involved. Hence, problems calling for strategic decisions require to be considered by top management.

   - *Strategic issues involve the allocation of large amounts of company resources*: It may require huge financial investment to venture into a new area of business or the organization may require huge number of manpower with new set of skills in them.

   - *Strategic issues are likely to have a significant impact on the long term prosperity of the firm*: Generally the results of strategic implementation are seen on a long term basis and not immediately.

   - *Strategic issues are future oriented*: Strategic thinking involves predicting the future environmental conditions and how to orient for the changed conditions.

   - *Strategic issues usually have major multifunctional or multi-business consequences:* As they involve organization in totality they affect different sections of the organization with varying degree.

   - *Strategic issues necessitate consideration of factors in the firm's external environment: Strategic focus in organization involves orienting its internal environment to the changes of external environment.*

10. The BCG growth-share matrix is the simplest way to portray a corporation's portfolio of investments. Growth share matrix also known for its cow and dog metaphors is popularly used for resource allocation in a diversified company. Using the BCG approach, a company classifies its different businesses on a two-dimensional growth-share matrix. 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.

Using the matrix, organisations can identify four different types of products or SBU as follows:

- Stars are products or SBUs that are growing rapidly. They also need heavy investment to maintain their position and finance their rapid growth potential. They represent best opportunities for expansion.

- Cash Cows are low-growth, high market share businesses or products. They generate cash and have low costs. They are established, successful, and need less investment to maintain their market share. In long run when the growth rate slows down, stars become cash cows.
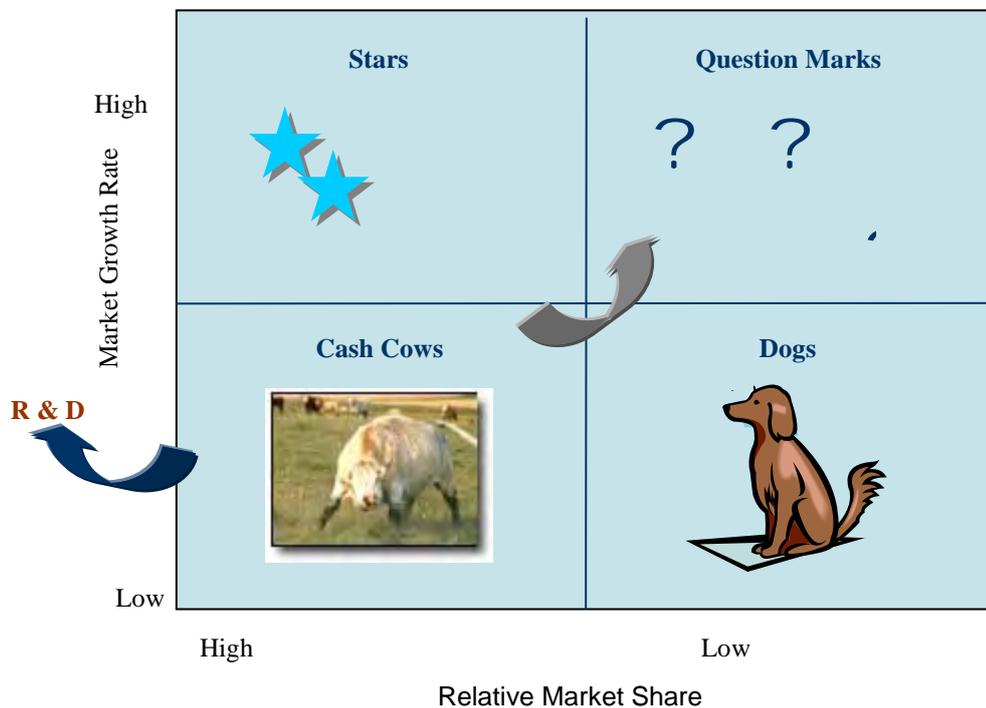

Figure: BCG Growth-Share Matrix

- Question Marks, sometimescalled problem children or wildcats, are low market share business in high-growth markets. They require a lot of cash to hold their share. They need heavy investments with low potential to generate cash. Question

marks if left unattended are capable of becoming cash traps. Since growth rate is high, increasing it should be relatively easier. It is for business organisations to turn them stars and then to cash cows when the growth rate reduces.

- **Dogs** are low-growth, low-share businesses and products. They may generate enough cash to maintain themselves, but do not have much future. Sometimes they may need cash to survive. Dogs should be minimised by means of divestment or liquidation.

Once the organisations have classified its products or SBUs, it must determine what role each will play in the future. The four strategies that can be pursued are:

(i)   **Build:** Here the objective is to increase market share, even by forgoing short-term earnings in favour of building a strong future with large market share.

(ii) **Hold:** Here the objective is to preserve market share.

(iii) **Harvest:** Here the objective is to increase short-term cash flow regardless of long-term effect.

(iv) **Divest:** Here the objective is to sell or liquidate the business because resources can be better used elsewhere.

The growth-share matrix has done much to help strategic planning study; however, there are problems and limitations with the method. BCG matrix can be difficult, time-consuming, and costly to implement. Management may find it difficult to define SBUs and measure market share and growth. It also focuses on classifying current businesses but provide little advice for future planning. They can lead the company to placing too much emphasis on market-share growth or growth through entry into attractive new markets. This can cause unwise expansion into hot, new, risky ventures or giving up on established units too quickly.

11. 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.

12. Action plan for turnaround strategy, an organization can implement:

- Stage One – *Assessment of current problems*: The first step is to assess the current problems and get to the root causes and the extent of damage the problem has caused. Once the problems are identified, the resources should be focused toward those areas essential to efficiently work on correcting and repairing any immediate issues.

- Stage Two – *Analyze the situation and develop a strategic plan*: Before you make any major changes; determine the chances of the business's survival. Identify appropriate strategies and develop a preliminary action plan. For this one should look for the viable core businesses, adequate bridge financing and available organizational resources. Analyze the strengths and weaknesses in the areas of competitive position. Once major problems and opportunities are identified, develop a strategic plan with specific goals and detailed functional actions.

- Stage Three – *Implementing an emergency action plan*: If the organization is in a critical stage, an appropriate action plan must be developed to stop the bleeding and enable the organization to survive. The plan typically includes human resource, financial, marketing and operations actions to restructure debts, improve working capital, reduce costs, improve budgeting practices, prune product lines and accelerate high potential products. A positive operating cash flow must be established as quickly as possible and enough funds to implement the turnaround strategies must be raised.

- Stage Four – *Restructuring the business*: The financial state of the organization's core business is particularly important. If the core business is irreparably damaged, then the outlook for the entire organization may be bleak. Prepare cash forecasts, analyze assets and debts, review profits and analyze other key financial functions to position the organization for rapid improvement.

  During the turnaround, the "product mix" may be changed, requiring the organization to do some repositioning. Core products neglected over time may require immediate attention to remain competitive. Some facilities might be closed; the organization may even withdraw from certain markets to make organization leaner or target its products toward a different niche.

  The 'people mix' is another important ingredient in the organization's competitive effectiveness. Reward and compensation systems that encourage dedication and creativity encourage employees to think profits and return on investments.

- Stage Five – *Returning to normal*: In the final stage of turnaround strategy process, the organization should begin to show signs of profitability, return on investments and enhancing economic value-added. Emphasis is placed on a number of strategic efforts such as carefully adding new products and improving customer service, creating alliances with other organizations, increasing the market share, etc.

13. Refer to chapter 4. The term strategic management refers to the managerial process of forming a strategic vision, setting objectives, crafting a strategy, implementing and executing the strategy, and then subsequently initiating whatever corrective adjustments in the vision, objectives, strategy, and execution are deemed appropriate. The strategy-making/strategy-implementing process consists of five interrelated managerial tasks. These are:

- Setting vision and mission.

- Setting objectives.

- Crafting a strategy.

- Implementing and executing.

- Evaluating performance and initiating corrective adjustments.

14. The prominent areas where the human resource manager can play strategic role are as follows:

    1. **Providing purposeful direction:** The human resource management must be able to lead people and the organization towards the desired direction involving people. The management have to ensure harmony between organisational objectives and individual objectives. Objectives are specific aims which must be in the line with the goal of the organization and the all actions of each person must be consistent with them.

    2. **Creating competitive atmosphere:** In the present business environment, maintaining competitive position or gains is an important objective of any business. Having a highly committed and competent workforce is very important for getting a competitively advantageous position.

    3. **Facilitation of change:** The human resource manager will be more concerned about furthering the organization not just maintaining it. He has to devote more time to promote acceptance of change rather than maintaining the status quo.

    4. **Diversion of workforce:** In a modern organization, management of diverse workforce is a great challenge. Workforce diversity can be observed in terms of male and female, young and old, educated and uneducated, unskilled and professional employee and so on. Maintaining a congenial healthy work environment is a challenge for HR Manager. Motivation, maintaining morale and commitment are some of the key task that a HR manager has to perform.

5. **Empowerment of human resources:** Empowerment involves giving more power to those who, at present, have little control what they do and little ability to influence the decisions being made around them.

6. **Building core competency:** The human resource manager has an important role to play in developing core competency by the firm. A core competence is a unique strength of an organization which may not be shared by others. Organization of business around core competence implies leveraging the limited resources of a firm. It needs creative, courageous and dynamic leadership having faith in organization's human resources.

7. **Development of works ethics and culture:** A vibrant work culture will have to be developed in the organizations to create an atmosphere of trust among people and to encourage creative ideas by the people. Far reaching changes with the help of technical knowledge will be required for this purpose.

15. It is true that evaluating the worth of a business is central to strategy implementation. There are circumstances where it is important to evaluate the actual worth of the business. These circumstances can be wide and varied. At a higher level they may include acquisition, mergers or diversification. They may also include other situations such as fixing of share price in an issue. Acquisition, merger, retrenchment may require establishing the financial worth or cash value of a business to successfully implement such strategies.

    Various methods for determining a business's worth can be grouped into three main approaches.

    (i) **Net worth or stockholders' equity:** Net worth is the total assets minus total outside liabilities of an individual or a company.

    (ii) **Future benefits to owners through net profits:** These benefits are considered to be much greater than the amount of profits. A conservative rule of thumb is to establish a business's worth as five times the firm's current annual profit. A five-year average profit level could also be used.

    (iii) **Market-determined business worth:** This, in turn, involves three methods. First, the firm's worth may be based on the selling price of a similar company. The second approach is called the price-earnings ratio method whereby the market price of the firm's equity shares is divided by the annual earnings per share and multiplied by the firm's average net income for the preceding years. The third approach can be called the outstanding shares method whereby one has to simply multiply the number of shares outstanding by the market price per share and add a premium.

16. The most important phenomenon which often distinguishes one organisation with another is its corporate culture. Corporate culture refers to a Company's values, beliefs, business principles, traditions, and ways of operating and internal work environment. Every corporation has a culture that exerts powerful influences on the behaviour of managers.

(i) As a Strength: Culture can facilitate communication, decision making and control and instil cooperation and commitment. An organization's culture could be strong and cohesive when it conducts its business according to clear and explicit set of principle and values, which the management devotes considerable time to communicating to employees and which values are shared widely across the organisation.

(ii) As a weakness: Culture, as a weakness can obstruct the smooth implementation of strategy by creating resistance to change. An organization's culture could be characterised as weak when many sub-cultures exists, few values and behavioural norms are shared and traditions are rare. In such organizations, employees do not have a sense of commitment, loyalty and sense of identity.

17. Two basic approaches to leadership can be transformational leadership style and transactional leadership style.

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.

Whereas, transactional leadership style focus more on designing systems and controlling the organization's activities and are more likely to be associated with improving the current situation. Transactional leaders try to build on the existing culture and enhance current practices. Transactional leadership style uses the authority of its office to exchange rewards, such as pay and status. They prefer a more formalized approach to motivation, setting clear goals with explicit rewards or penalties for achievement or non-achievement.

Transactional leadership style may be appropriate in settled environment, in growing or mature industries, and in organizations that are performing well. The style is better suited in persuading people to work efficiently and run operations smoothly.

18. The critical elements of six sigma can be put into six themes as follows:

- *Theme one – genuine focus on the customer:* Companies launching six sigma often to find that how little they really understand about their customers. In six sigma, customer focus becomes the top priority. For example, the measures of six sigma performance begin with the customer. Six sigma improvements are defined by their impact on customer satisfaction and value.

- *Theme two* – *data and fact-driven management:* Six sigma takes the concept 'of "management by fact" to a new, more powerful level. Despite the attention paid in recent years to improved information systems, knowledge management, and so on, many business decisions are still being based on opinions, assumptions and gut feeling. Six sigma discipline begins by clarifying what measures are key to gauging business performance and then gathers data and analyzes key variables. Problems are effectively defined, analyzed, and resolved. Six sigma also helps managers to answer two essential questions to support data-driven decisions and solutions.

  What data/information is really required?

  How to use the data/information for maximum benefit?

- *Theme three* – *processes are where the action is* Designing products and services, measuring performance, improving efficiency and customer satisfaction and so on. Six sigma positions the process as the key vehicle of success. One of the most remarkable breakthroughs in Six Sigma efforts to date has been convincing leaders and managers. Process may relate to build competitive advantage in delivering value to customers.

- *Theme four* – *proactive management:* In simple terms, being proactive means acting in advance of events rather than reacting to them. In the real world, though, proactive management means making habits out of what are, too often, neglected business practices: defining ambitious goals and reviewing them frequently, setting clear priorities, focusing on problem prevention rather than fire-fighting, and questioning why we do things instead of blindly defending them.

  Far from being boring or overly analytical, being truly proactive is a starting point for creativity and effective change. Six sigma, encompasses tools and practices that replace reactive habits with a dynamic, responsive, proactive style of management.

- *Theme five* – *boundaryless collaboration:* "Boundarylessness" is one of Jack Welch's mantras for business success. Years before launching six sigma, GE's chairman was working to break barriers and to improve teamwork up, down, and across organizational lines. The opportunities available through improved collaboration within companies and with vendors and customers are huge. Billions of dollars are lost every day because of disconnects and outright competition between groups that should be working for a common cause: providing value to customers.

- *Theme six* – *drive for perfection; tolerate failure:* Organizations need to make efforts to achieve perfection and yet at the same time tolerate failure. In essence, though, the two ideas are complementary. No company will get even close to six sigma without launching new ideas and approaches-which always involve some risk. Six sigma cannot be implemented by individuals who are overly cautious and are scared of making mistakes.

19. TQM is quite different from traditional management practices, requiring changes in organizational processes, beliefs and attitudes, and behaviours. "Traditional management" means the way things are usually done in most organizations in the absence of a TQM focus. Many "traditional" organizations have been applying TQM principles all along, so not all of these comments pertain to every organization. The nature of TQM differs from common management practices in many respects. Some of the key differences are as follows:

- **Strategic Planning and Management:** Quality planning and strategic business planning are indistinguishable in TQM. Quality goals are the cornerstone of the business plan. Measures such as customer satisfaction, defect rates, and process cycle times receive as much attention in the strategic plan as financial and marketing objectives.

- **Changing Relationships with Customers and Suppliers:** In TQM, quality is defined as products and services beyond present needs and expectations of customers. Innovation is required to meet and exceed customers' needs. Traditional management places customers outside of the enterprise and within the domain of marketing and sales. TQM views everyone inside the enterprise as a customer of an internal or external supplier, and a supplier of an external or internal customer. Marketing concepts and tools can be used to assess internal customer needs and to communicate internal supplier capabilities.

- **Organizational Structure:** TQM views the enterprise as a system of interdependent processes, linked laterally over time through a network of collaborating (internal and external) suppliers and customers. Each process is connected to the enterprise's mission and purpose through a hierarchy of micro- and macro-processes. Every process contains sub-processes and is also contained within a higher process. This structure of processes is repeated throughout the hierarchy.

- **Organizational Change:** In TQM the environment in which the enterprise interacts is considered to be changing constantly. Management's job, therefore, is to provide the leadership for continual improvement and innovation in processes and systems, products, and services. External change is inevitable, but a favourable future can be shaped.

- **Teamwork:** In TQM individuals cooperate in team structures such as quality circles, steering committees, and self-directed work teams. Departments work together toward system optimization through cross-functional teamwork.

- **Motivation and Job Design:** TQM managers provide leadership rather than overt intervention in the processes of their subordinates, who are viewed as process managers rather than functional specialists. People 'are motivated to make meaningful contributions to what they believe is an important and noble cause, of value to the enterprise and society. The system enables people to feel like winners.