

**PAPER – 7: INFORMATION TECHNOLOGY AND STRATEGIC MANAGEMENT**

**SECTION – A: INFORMATION TECHNOLOGY**

**QUESTIONS**

1. Define the following terms briefly:
  - (i) Internet Server
  - (ii) Device Drivers
  - (iii) Local Area Network (LAN)
  - (iv) Network Interface Card (NIC)
  - (v) Hub
  - (vi) Repeaters
  - (vii) Internet Browser
  - (viii) ASCII Code
  - (ix) Electronic Funds Transfer (EFT)
  - (x) File Transfer Protocol (FTP)
2. Convert the following from one number system to another number system along with the working notes:
  - (i)  $(1001110011)_2 = ( )_{10}$
  - (ii)  $(1005)_{10} = ( )_2$
  - (iii)  $(855.05)_{10} = ( )_2$
3. Distinguish between the following:
  - (i) Internet and WWW
  - (ii) Transmission Control Protocol and Internet Protocol
  - (iii) Shareware and Open Source Software
  - (iv) ASCII code and ASCII-8 code
  - (v) Repeaters and Gateways

**Software**

4. Discuss Systems Software.

**Data Types**

5. (a) What do you understand by the term "Data Type".  
(b) Discuss in brief, some of the various types of "Data Types".

**Data Base Management Systems**

6. (a) What is Database System? Discuss its major parts.  
(b) Discuss DBMS structure.

**Communication Media**

7. What is communication media? Discuss its various types.

**Multi-Tier Architecture**

8. Discuss multi-tier architecture.

**Data Centre**

9. Discuss Data Centre protection challenges and best practices solutions.

**Flowchart**

10. Draw a flow chart to compute and print income-tax and surcharge on the income of a person, where income is to be read from terminal and tax is to be calculated as per the following rates:

Upto ₹ 40,000	No tax
Upto ₹ 60,000	@ 10% of amount above ₹ 40,000
Upto ₹ 1,50,000	₹ 2,000 + 20% of amount above ₹ 60,000
Above ₹ 1,50,000	₹ 20,000 + 30% of amount above ₹ 1,50,000

Charge surcharge @ 2% on the amount of total tax, if the income of a person exceeds ₹ 2,00,000.

**World Wide Web**

11. What is WWW? Discuss its components.

**MODEM**

12. What is a MODEM? Discuss its various types in detail.

**OSI Model**

13. Discuss OSI Model in detail.

**Information Systems**

14. Discuss the problem areas of the paper based information systems.

**Language Translators**

15. Discuss Language Translator in detail.

**SUGGESTED HINTS/ANSWERS**

1. (i) **Internet Server:** An Internet Server is a special computer build up with high quality components and is stored in data centre to ensure better Internet connectivity across the world for sharing of information.
- (ii) **Device Drivers:** Device drivers are small files that act as an interface between hardware in a computer system and the operating system. Hardware requires device drivers so that the operating system can “see” the devices and handle them effectively and efficiently.
- (iii) **Local Area Network (LAN):** A LAN is a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school. The defining characteristics of LANs include usually higher data-transfer rates, smaller geographic range and lack of a need for leased telecommunication lines. A LAN is useful for sharing resources like files, printers, games or other applications.
- (iv) **Network Interface Card (NIC):** Network Interface Card constructs, transmits, receives, and processes data to and from a host to network. Each NIC has 8 bytes permanent and unique MAC (Media Access Control) address which is known as Physical Address and is provided by the manufacturer.
- (v) **Hub:** A hub is a multi port connecting device that is used to interconnect LAN devices and extend the physical length of a network. 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.
- (vi) **Repeaters:** Repeaters are devices that solve the snag of signal degradation which results as data is transmitted along the various cables. The repeaters boost or amplify the signal before passing it through to the next section of cable.
- (vii) **Internet Browser:** An Internet Browser or a web browser is a software application that enables a user to display and interact with text, images, and other information typically located on a web page at a website on the World Wide Web or a LAN by means of hyperlinks. Web browsers available for personal computers include Microsoft Internet Explorer, Mozilla Firefox, Apple Safari, Netscape, and Opera.
- (viii) **ASCII Code:** ASCII (American Standard Code for Information Interchange) is a seven-bit code with which up to 128 characters can be coded and is used extensively in small computers, peripherals, instruments and communications devices. This includes both unprintable control codes (0-31) used to control various devices in computer and printable control codes (32-127) that represent lower case and upper case letters, digits, punctuation marks, and other symbols.

(ix) **Electronic Funds Transfer (EFT):** Electronic Funds Transfer (EFT) represents the way the business can receive direct deposit of all payments from the financial institution to the company bank account. Once the user signs up, money come to him directly and sooner than ever before. EFT is fast, safe and means that the money will be confirmed in user’s bank account quicker.


(x) **File Transfer Protocol (FTP):** The File Transfer Protocol (FTP) is used widely on the Internet for transferring files to and from a remote host. FTP is commonly used for uploading pages to a Web site and for providing online file archives. An FTP URL has the basic form: ftp://user:pass@host/directory/file.

2. (i)  $(1001110011)_2 = ( \quad )_{10}$   
 $= 1 \times 2^9 + 0 \times 2^8 + 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$   
 $= 512 + 0 + 0 + 64 + 32 + 16 + 0 + 0 + 2 + 1$

$(1001110011)_2 = (627)_{10}$

(ii)  $(1005)_{10} = ( \quad )_2$

2	1005	Remainder
2	502	1
2	251	0
2	125	1
2	62	1
2	31	0
2	15	1
2	7	1
2	3	1
2	1	1
2	0	1



$(1005)_{10} = (1111101101)_2$

(iii)  $(855.05)_{10} = ( \quad )_2$

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	855	Remainder
2	427	1
2	213	1
2	106	1
2	53	0
2	26	1
2	13	0
2	6	1
2	3	0
2	1	1
2	0	1

$$(855)_{10} = (1101010111)_2 \quad \dots\dots\dots(i)$$

Step – II

Integer Part

.05 x 2	=	0.10	0
.10 x 2	=	0.20	0
.20 x 2	=	0.40	0
.40 x 2	=	0.80	0
.80 x 2	=	1.60	1
$(.05)_{10}$	=	$(0.00001)_2$	$\dots\dots\dots(ii)$

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

$$(855.05)_{10} = (1101010111.00001)_2$$

3. (i) Difference between Internet and WWW are listed below:

	Internet	WWW
Nature	Hardware	Software
Comprises of	Network of Computers, copper wires, fiber - optic cables & wireless networks	Files, folders & documents stored in various computers
Governed By	Internet Protocol	Hyper Text Transfer Protocol
Dependency	This is the base platform and is independent of WWW	It depends on the Internet to work

- (ii) **Transmission Control Protocol (TCP):** The TCP provides reliable transmission of data in an Internet Protocol environment. TCP corresponds to the Transport layer (Layer 4) of the OSI reference model that provides stream data transfer, reliability, efficient flow control, full-duplex operation, and multiplexing.

**Internet Protocol (IP):** The Internet Protocol (IP) is a Network-layer (Layer 3) protocol that contains addressing information and some control information that enables packets to be routed.

- (iii) **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.

**Open Source Software:** Open Source software is created by generous programmers and released into the public domain for public use. There is usually a copyright notice that must remain with the software product. Many popular Open Source applications are being developed and upgraded regularly by individuals and companies that believe in the Open Source concept.

- (iv) **ASCII Code:** ASCII stands for American Standard Code for Information Interchange and is a seven-bit code. ASCII code is used extensively in small computers, peripherals, instruments and communications devices. This includes both unprintable control codes (0-31) used to control various devices in computer and printable control codes (32-127) that represents lower case and upper case letters, digits, punctuation marks, and other symbols. With 7 bits, up to 128 characters can be coded.

**ASCII-8 Code:** A newer version of ASCII is the ASCII-8 code, which is an 8-bit code. With 8 bits, the code capacity is extended to 256 characters. This includes graphics, symbols and mathematical representations.

- (v) **Repeaters:** These are devices that solve the snag of signal degradation which results as data is transmitted along the various cables. The repeater boosts or amplifies the signal before passing it through to the next section of cable.

**Gateways:** Gateways can translate data from one protocol to another and are usually used to link LANs of different topologies, e.g., Ethernet and Token Ring, so enabling the exchange of data.

4. **Systems Software:** Systems software is computer software designed to operate the computer hardware and to provide and maintain a platform for running application software. Therefore, Systems Software may be defined as a set of one or more programs designed to control the operation of computer system. 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 systems 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.

5. (a) **Data Type:** A data type is a classification of various types of data, stating the possible values for that type, the operations that can be done on that type, and the way the values of that type are stored. It is a set of data with values having predefined characteristics. Examples of data types are: Integer, Single and Double Precision, Logical, Character, String, Memo, Index Field, Currency and Date fields.
- (b) Some of the various "Data Types" are as follows:
- **Integer Number:** An integer data type can hold a whole number, but no fraction. Integers may either be signed (allowing negative values) or unsigned (non-negative values only). Various sizes of integer vary from 8 bit to 64 bit word length. Byte, Word, Long and Double are the types of Integer data types.
  - **Single and Double Precision:** Real data values are commonly called single precision data because each real constant is stored in a single memory location. This usually gives seven significant digits for each real value. Further, any programming languages provide the double precision data type which is stored in two memory locations, thus providing twice as many significant digits.
  - **Logical:** The Logical data type is used to store data that has only two Boolean values True (T) or False (F) and holds the size of 1 byte.
  - **Character:** The Character data type includes letters, numbers, spaces, symbols, and punctuation. Character fields or variables store text information such as names, addresses, and numbers that are not used in mathematical calculations. For example, phone numbers or zip codes, though they include mostly numbers, are actually best used as Character values. It holds the size of 1 byte.
  - **String:** A String data type consists of a sequence of contiguous characters that represent the characters themselves rather than their numeric values and can include letters, numbers, spaces, and punctuation. The codes for String characters range from 0–255.
  - **Memo:** The Memo data type is used if we need to store more than 255 characters. A Memo field can store up to 65,536 characters.
  - **Index Field:** Index fields are used to store relevant information along with a document. The data input to an Index Field is used to find those documents when needed. The program provides up to twenty-five user-definable Index Fields in an Index Set. An index field can be one of three types: Drop-Down Look-Up List, Standard, and Auto-Complete History List.
  - **Currency Field:** The currency field accepts data in dollar form by default.
  - **Date Field:** The date field accepts data entered in date format.

6. (a) **Database System:** Both the database and DBMS software collectively is called Database System. A database system has four major parts: Data, Hardware, Software and Users, which coordinate with each other to form an effective database system.

(i) **Data:** The data acts as a bridge between machine parts i.e. hardware and software and the users, who access it directly or through some application programs. The data stored in the system is partitioned onto one or more databases. A database is a repository for stored data. In general, it is both integrated and shared.

By integrated, it is meant that the database is a unification of several otherwise distinct data files. The individual pieces of data in the database may be shared among several different users in the sense that each of them may have access to the same piece of data. Such sharing is really a consequence of the fact that the database is integrated.

(ii) **Hardware:** The hardware consists of the secondary storage devices such as magnetic disks (hard disk, zip disk, floppy disks), optical disks (CD-ROM), magnetic tapes, etc. on which data is stored together with the I/O devices (mouse, keyboard, printers), processors, main memory, etc. for storing and retrieving the data in a fast and efficient manner and the secondary storage volumes, disks, drums, etc. on which the database resides, together with the associated devices, control units, channels, and so forth.

(iii) **Software:** The software part of a DBMS acts as a bridge between user and the database. In other words, software interacts with users, application programs, and database and files system of a particular storage media (hard disk, magnetic tapes etc.) to insert, update, delete and retrieve data.

(iv) **Users:** The broad classes of users are: Application Programmers and System Analysts; End users; DBA & Database engineers.

(b) Structure of DBMS is discussed as follows:

(i) **DDL Compiler –**

(a) It converts data definition statements into a set of tables;

(b) Tables contain meta data (data about the data) concerning the database; and

(c) It gives rise to a format that can be used by other components of database.

(ii) **Data Manager –**

(a) It is the central software component;

(b) It is referred to as the database control system; and



(c) It converts operations in users' queries to physical file system.

**(iii) File Manager –**

- (a) It is responsible for file structure;
- (b) It is responsible for managing the space;
- (c) It is responsible for locating block containing required record;
- (d) It is responsible for requesting block from disk manager; and
- (e) It is responsible for transmitting required record to data manager.

**(iv) Disk Manager –**

- (a) It is a part of the Operating System;
- (b) It carries out all physical input / output operations; and
- (c) It transfers block / page requested by file manager.

**(v) Query Manager –**

- (a) It interprets user's online query;
- (b) It converts to an efficient series of operations;
- (c) In a form it is capable of being sent to data manager;
- (d) It uses data dictionary to find structure of relevant portion of database;
- (e) It uses information to modify query; and
- (f) It prepares an optimal plan to access database for efficient data retrieval.

**(vi) Data Dictionary –**

- (a) It maintains information pertaining to structure and usage of data and meta data; and
- (b) It is consulted by the database users to learn what each piece of data and various synonyms of data field means.

7. Communication media comprises different types of cables and wireless techniques that are used to connect network devices in a Local Area Network (LAN), Wireless Local Area Network (WLAN) or Wide Area Network (WAN). Choice of correct type of media is very important for the implementation of any network. Communication or Transmission media is divided into two groups:

- (i) Guided Media:** Guided Transmission Media or Bound Media uses a "cabling" system that guides the data signals along a specific path. Some of the common examples of guided media are Twisted Pair, Coaxial cable and Optical fiber.

The types of guided media are described as follows:

- **Twisted-Pair Cables:** Twisted-Pair cables contain pairs of insulated copper wires twisted together to reduce the impact of interferences. There are two types of twisted-pair cables called Unshielded Twisted-Pair (UTP) cable and Shielded Twisted-Pair (STP) cable. Twisted-Pair cables can carry data at a speed of 10 Mbps, 100 Mbps and 1000 Mbps and can transmit data up to 100 meters.
  - **Co-axial cables:** Also called as Coax, these contain central copper wire as its core that is surrounded by two layers of protective shielding that reduces electromagnetic interference. Co-axial cables used in computer networks are of two types - Thick co-axial and Thin co-axial cable. Coax can transmit data at a maximum speed of 10 Mbps up to 500 meters without using repeaters.
  - **Optical Fiber:** An optical fiber (or fiber) is a glass or plastic fiber that carries light along its length. Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher data rates (called bandwidth), than other forms of communications. Fibers are used instead of metal wires because signals travel along them with less loss, and they are immune to electromagnetic interference.
- (ii) **Unguided Media:** Unguided transmission media or Unbound Media consists of a means for the data signals to travel but nothing to guide them along a specific path. The data signals are not bound to a cabling media. Some of the common examples of unguided media are Radio wave, Microwave and Infrared wave. These are described as follows:
- **Radio Waves:** Radio waves are an invisible form of electromagnetic radiation that varies in wavelength from around a millimeter to 100,000 km, making it one of the widest ranges in the electromagnetic spectrum. Radio waves are most commonly used transmission media in the wireless Local Area Networks.
  - **Micro Waves:** Microwaves are radio waves with wavelengths ranging from as long as one meter to as short as one millimeter, or equivalently, with frequencies between 300 MHz (0.3 GHz) and 300 GHz. These are used for communication, radar systems, radio astronomy, navigation and spectroscopy.
  - **Infrared Waves:** Infrared light is used in industrial, scientific, and medical applications. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected. Infrared tracking, also known as Infrared Homing, refers to a passive missile guidance system which uses the emission from a target of electromagnetic radiation in the infrared part of the spectrum to track it.

8. **Multi-tier Architecture:** Multi-tier architecture (often referred to as n-tier architecture) is a client-server architecture in which an application is executed by more than one distinct software agent. For example, an application that uses middleware to service data requests between a user and a database employs multi-tier architecture. The most widespread use of "multi-tier architecture" refers to three-tier architecture.

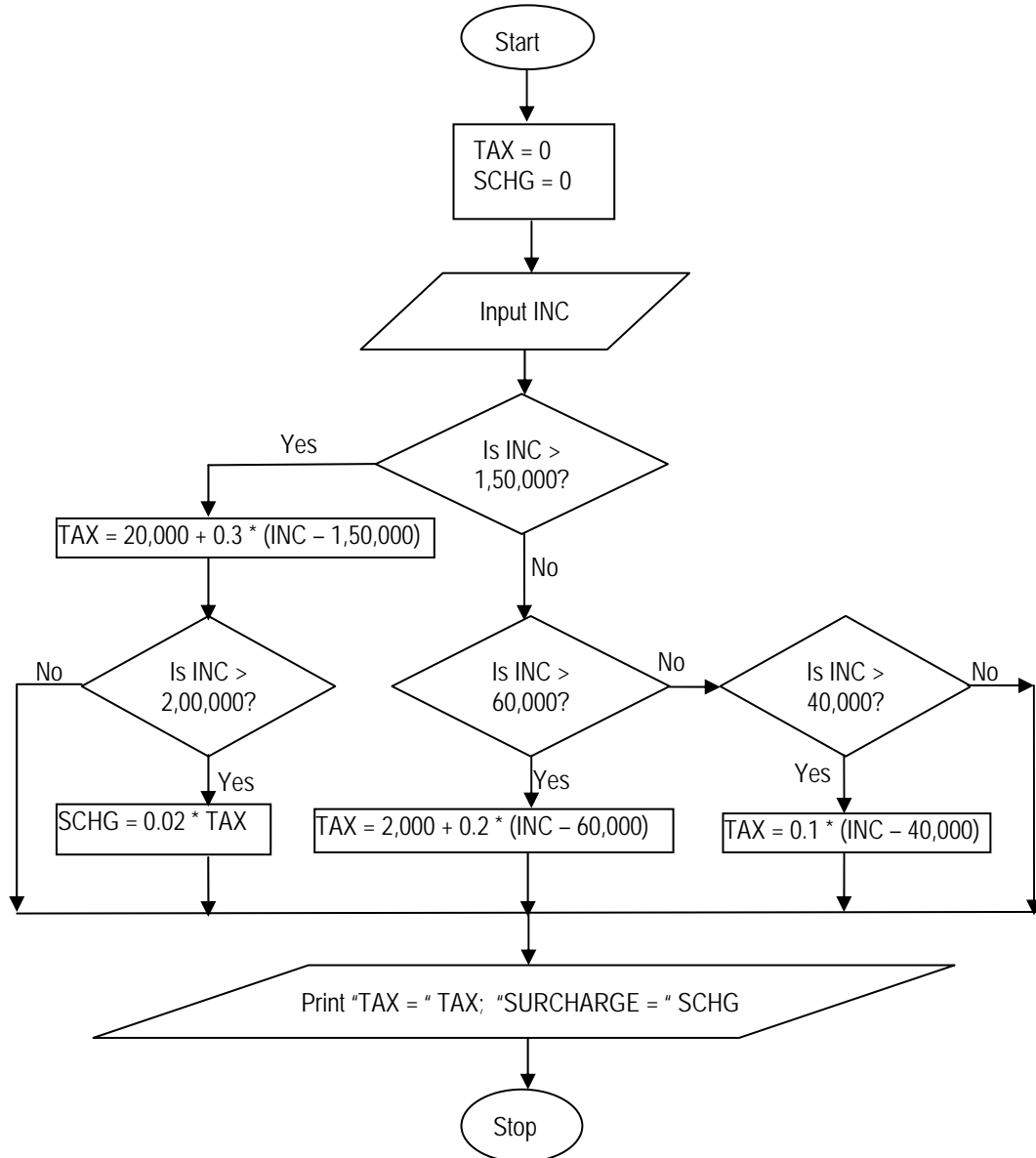
The client program has only User Interface (UI) code that talks, via a network, to the "middle tier" on which the business and database logic sits which in turn, via a network, talks to the database. In practice the middle tier can be placed, if necessary, on the same machine as the database.

In either architecture, the data "traffic" is highest between database logic and database server. This means that the network infrastructure that connects the database logic with the database server needs to be very high bandwidth; i.e. expensive.

The advantages of a multi-tier architecture are:

- Forced separation of UI and business logic;
  - Low bandwidth network;
  - Business logic sits on a small number (may be just one) of centralized machines; and
  - Enforced separation of UI and business logic.
9. Large enterprise IT managers understand the criticality of data protection challenges and try to mitigate the cost, risk and complexity of data protection throughout their enterprises — including data centers, disaster recovery sites and branch locations. Some of the top challenges faced by large enterprise IT managers and the best practices for overcoming them are as follows:
- (i) **Control skyrocketing data growth:** Data growth is the biggest data center hardware infrastructure challenge for large enterprises. Several types of data deduplication technologies help in reducing data storage needs by eliminating redundant data. Data deduplication also reduces the data that must be sent across a WAN for remote backups, network replication, and disaster recovery.
  - (ii) **System performance and scalability:** To avoid data center sprawl in the data protection environment, IT managers should look ahead 3-5 years and choose a data protection "target" system that will scale to accommodate the performance and capacity they will need without adding new system images. It also saves money in administration time by eliminating the need to load balance and tune new systems needed for scaling.

- (iii) **Network congestion and connectivity architecture:** The new generation of servers with multi-core processors demands significantly high input/output (I/O), and if these servers are virtualized, this requirement further goes up, which is one of the biggest data center infrastructure challenge. Vendors should help its customers to be strategic with their network infrastructure rather than using the traditional LAN switches that are not designed to meet the sudden upsurge in network demand.
  - (iv) **IT administration and staff time at premium:** Data protection IT administrators have more data to protect and more complex data protection standards to meet while staying within a limited budget. They need to invest in systems that automate disk-subsystem management, reduce complexity, and provide effective dashboards and reporting. Minimum requirements for large enterprise data protection platforms include: automatic load balancing and tuning; automatic system monitoring and “phone home” functionality; and providing dashboards and reporting.
  - (v) **Inadequate Disaster Recovery plans:** Large enterprises that have been using physical tape backup systems and disparate disk-based solutions in branch offices are particularly vulnerable to downtime and data loss in the event of a disaster. Enterprise IT managers should consider the use of a consistent platform that enables IT staff to manage remote-office backup, deduplication, replication and restore operations from a data center headquarters. It also minimizes the burden on IT administrators in branch locations and provides administrators with a company-wide view of data protection efficiency.
  - (vi) **Adopting new risk prone, cost-effective data protection technologies:** With limited budgets and resources, IT managers have worked to protect their investment in existing technologies. IT managers should look for enterprise-class data protection solutions that mitigate these costs and risk with features such as robust tape emulation and storage pooling.
  - (vii) **Resource balancing:** The enterprise chief technical officer needs to strike a working balance between reduced operational budgets, increased demands on existing infrastructure, maximizing availability, ensuring round-the-clock monitoring and management, and the periodic upgrades that today’s technology demands.
10. Let us define the variables:
- SCHG: Surcharge on the income of a person;
- TAX: Income Tax of a person;
- INC: Income of a person
- The required flow chart is as follows:



11. 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 discussed below:

- (i) **HTML:** HTML stands for HyperText Markup Language and is the main markup language for web page. HTML lets the creator of a Web page specify how text will be displayed and how to link to other Web pages, files, and Internet services. These links are formally known as hypertext links, because they are activated when a user clicks on specific text or images within a Web page.
  - (ii) **HTTP:** All computers in the Web communicate with each other using a communication standard called Hypertext Transfer Protocol (HTTP). HTTP is defined as the set of rules for transferring files (text, graphic images, sound, video, and other multimedia files) on the World Wide Web. As soon as a Web user opens their Web browser, the user is indirectly making use of HTTP.
  - (iii) **URIs:** Uniform Resource Identifier (URI) is a string of characters used to identify a resource either by location, name or both. Such identification enables interaction with representations of the resource over a network (typically the World Wide Web) using specific protocols. URIs can be classified as names (URNs) and locators (URLs), or as both.
  - (iv) **Web Hardware and Software:** Web pages reside on servers that run special software that allow users to access Web pages and to activate links to other Web pages and to Internet services. A user can directly access any Web page on one of these servers and then follow the links to other pages. Computers reading the Web pages are called a Web Client that view the pages with a program called a Web Browser. The Web browser reads a specified Web page using the HTML commands within the Web page to display the desired information. Text positioning, fonts, colors, and size are specified through HTML. The browser software interprets the HTML commands and displays the information on the user's monitor.
12. **MODEM:** MODEM stands for Modulator/Demodulator. In the simplest form, MODEM is defined as an encoding as well as decoding device used in data transmission. Data communication could be achieved due to the development of encoding/decoding devices.

In other words, MODEM is a device that converts a digital computer signal into an analog telephone signal (i.e. it modulates the signal) and converts an analog telephone signal into a digital computer signal (i.e. it demodulates the signal) in a data communication system. Modems are used for handling data streams from a peripheral device to the CPU and vice versa through the common carrier network. MODEMs are required to telecommunicate computer data with ordinary telephone lines because computer data is in digital form but telephone lines are analogue. One of the greatest benefits of a modem is that it confers the ability to access remote computers. It allows higher speed of data transmission and reduces the efforts of noise and distortion.

**Types of MODEMs:** MODEMs are classified on the basis of different criteria such as the place where they are installed, the manner in which they accept information and the way

they transmit signals. Based on these criteria, MODEMs are classified into the following types:

(i) **External vs. Internal Modems (on the basis of place where they are installed)**

**External Modem:** This is a modem separated from the computer system unit and is connected to the serial port of the computer by means of a cable. It is connected to the telephone wall jack by another cable and can be switched off or on easily too. The lights on the external modem also inform about the status of transmission of data.

**Internal Modem:** An internal modem is a circuit board (a modem card) that can be added to the system unit of the computer and takes one of the expansion slots. An internal modem is a device installed inside a desktop or laptop computer, allowing the computer to communicate over a network with other connected computers.

(ii) **Standard vs. Intelligent Modems (on the basis of the manner in which they accept information)**

**Standard Modems:** Standard modems are usually operated by commands entered from a microcomputer keyboard. Users control the functions (dialing, etc.) of a modem through the keyboard.

**Intelligent Modems:** Intelligent modems are also called Advanced modems that can accept new instructions and then respond to the commands while transmitting data and information. These can be done by microprocessor chips and internal Read Only Memory (ROM) contained in the modem. These modems are more expensive.

(ii) **Short-Haul and Wireless Modems (on the basis of the way the signals are transmitted)**

**Short-Haul Modems:** Short-haul modems are devices that transmit signals down the cable through any COM1 port. They sometimes are called modem eliminators, because they do not require an external power source. They are also called line drivers that can send data for a distance of more than one mile. This type of modem can be used within or across several buildings in a company or a university campus.

**Wireless Modems:** Wireless modems transmit the data signals through the air instead of by using a cable. They sometimes are called a radiofrequency modem. This type of modem is designed to work with cellular technology, and wireless LANs.

13. 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 layer 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.
- **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). 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. 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; modulation or conversion between the representation of digital data in user equipment and the corresponding signals transmitted over a communications channel.

14. Some problems with paper-based information systems that EDI can address are as follows:

- (i) **Labour costs** - In a paper based system, manual processing is required for data keying, document storage and retrieval, document matching, envelope stuffing etc.
- (ii) **Errors** - Since the same information is keyed in a number of times, paper-based systems are error-prone.
- (iii) **Inventory** -Due to the fact that delays and uncertainties are commonplace in paper processing, inventories may be higher than they need to be.
- (iv) **Uncertainty** - Uncertainty exists in three areas. Firstly, transportation and keying delays mean that timing is uncertain. Secondly, the sender does not know whether the matter dispatched was received at all. Thirdly, in the payment area, it is difficult to tell when the bank will disburse the cheque.

The implementation of EDI reduces the mail and processing delays. Uncertainty with regard to timings is discarded in some cases and lessened in others. This enables a firm to forecast cash flows more accurately.

15. **Language Translator:** 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. Most computer installations have several language processors available, one for each programming language the computer can accept.

The three most widely used types of language translators are compilers, interpreters, and assemblers.

**Compilers:** Compilers translate the entire program into machine language before the program is executed. Compilers are most commonly used system software to translate high-level languages such as COBOL, FORTRAN, and Pascal into Low level language. 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). The compiler then translates the program 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). It is the load program that the computer actually executes.

**Interpreters:** Whereas compilers translate programs into machine language all at once before programs are run, interpreters translate programs a line at a time as they are being run. For instance, if a user has a program in which a single statement is executed a thousand times during the course of the program's run, the interpreter would translate that statement a thousand different times into machine language. With an interpreter, each statement is translated into machine language just before it is executed. No object module or storable load module is ever produced.

They are usually easier and faster to use, since the user is not bothered with distinct and time-consuming compile, link-edit, and execution stages. They typically provide users with superior error messages. An interpreter for a 3GL typically requires less storage space in primary memory than a compiler for that language. Interpreters are usually less expensive than compilers.

**Assemblers:** 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. Assemblers are used exclusively with assembly languages.

**SECTION – B: STRATEGIC MANAGEMENT  
QUESTIONS**

**Correct/Incorrect with reasoning**

1. State with reasons which of the following statements are correct/incorrect:
  - (a) PESTLE analysis is used to monitoring the micro environmental factors.
  - (b) Growth share matrix is popularly used for resource allocation.
  - (c) For a small entrepreneur vision and mission are irrelevant.
  - (d) Vertical diversification integrates firms forward or backward in the product chain.
  - (e) Production strategy implements, supports and drives higher strategies.
  - (f) SBU concepts facilitate multi-business operations.
  - (g) Strategies may require changes in organizational structure.
  - (h) Benchmarking is a remedy for all problems faced by organizations.
  - (i) The thrust of operational control is on individual tasks or transactions.

**Explain the concepts**

2. Explain the meaning of the following concepts:
  - (a) Demographic environment
  - (b) ADL Matrix
  - (c) Directional Strategies
  - (d) Synchro-marketing

**Differences between the two concepts**

3. Distinguish between the following:
  - (a) Transformational and transactional leadership
  - (b) SWOT and TOWS Matrix
  - (c) Mergers and acquisitions

**Short notes**

4. Write short notes on the following:
  - (a) Global strategy
  - (b) Corporate culture
  - (c) Value chain analysis
  - (d) Co-generic merger

**Brief answers**

5. Briefly answer the following questions:
  - (a) "Environment is the sum of several external and internal forces that affect the functioning of business." Explain.
  - (b) Liquidation is the last resort option for a business organisation. Explain.
  - (c) Briefly explain the need of turnaround strategy.
  - (d) 'A network structure is suited to unstable environment.' Elaborate.

**Chapter 1-Business Environment**

6. Discuss the Porter's model for systematically diagnosing the significant competitive pressures in a market.
7. Explain how technological factors present an opportunity as well as threat to a particular business organization.

**Chapter 2-Business Policy and Strategic Management**

8. What do you understand by strategic management? Discuss its framework.
9. "Strategy is partly proactive and partly reactive." Do you agree? Give reasons for your answer.

**Chapter 3-Strategic Analysis**

10. Explain the model which has been inspired from traffic control lights.
11. An organization wants to start a new business and would like to understand the structure of competition in the industry. Identify the factors that an organization should analyze.

**Chapter 4-Strategic Planning**

12. What do you understand by 'Strategy'? Explain the four generic strategies as discussed by Glueck and Jauch.
13. How a company can deal with strategic uncertainty?

**Chapter 5-Formulation of Functional Strategy**

14. What are the three major research and development approaches for implementing strategies.
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 the management of internal linkages in the value chain analysis creates competitive advantage?

17. An important part of strategic management process is implementation of strategy. Discuss the relationship of soundness of strategy formulation with the quality of implementation.

#### Chapter 7-Reaching Strategic Edge

18. Define TQM? Explain the various principles that guide success of TQM.
19. 'The growing use of the internet by businesses and consumers is changing the competitive scenario.' Identify the characteristics of the E-commerce environment doing so.

#### SUGGESTED ANSWERS / HINTS

1. (a) **Incorrect:** The term PESTLE Analysis is used to describe a framework for analysis of macro environmental factors. It involves identification of political, economic, socio-cultural, technological, legal and environmental influences on an organization and providing a way of scanning the environmental influences that have affected or are likely to affect an organization or its policy. The advantage of this tool is that it encourages management into proactive and structured thinking.
- (b) **Correct:** Growth share matrix also known for its cow and dog metaphors is popularly used for resource allocation in a diversified company. Primarily, it categorises organisations/products on the basis two factors consisting of the growth opportunities and the market share enjoyed.
- (c) **Incorrect:** Entrepreneur, big or small has to function within several influences external forces. Competition in different form and different degree is present in all kind and sizes of business. Even entrepreneur with small businesses can have complicated environment. To grow and prosper they need to have clear vision and mission.
- (d) **Correct:** In vertically integrated diversification, firms opt to engage in businesses that are related to the existing business of the firm. It moves forward or backward in the chain and enters specific products with the intention of making them part of new businesses for the firm.
- (e) **Correct:** For effective implementation of higher level strategies, strategists need to provide direction to functional managers, including production, regarding the plans and policies to be adopted. Production strategy provides a path for transmitting corporate and business level strategy to the production systems and makes it operational. It may relate to production planning, operational system, control and research & development.
- (f) **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.

- (g) **Correct:** Strategies may require changes in structure as the structure dictates how resources will be allocated. Structure should be designed to facilitate the strategic pursuit of a firm and, therefore, should follow strategy. Without a strategy or reasons for being, companies find it difficult to design an effective structure.
  - (h) **Incorrect:** Benchmarking is an approach of setting goals and measuring productivity based on best industry practices and is a process of continuous improvement in search for competitive advantage. However, it is not panacea for all problems. Rather, it studies the circumstances and processes that help in superior performance. Better processes are not merely copied. Efforts are made to learn, improve and evolve them to suit the organizational circumstances.
  - (i) **Correct:** The thrust of operational control is on individual tasks or transactions as against total or more aggregative management functions. For example, procuring specific items for inventory is a matter of operational control, in contrast to inventory management as a whole. One of the tests that can be applied to identify operational control areas is that there should be a clear-cut and somewhat measurable relationship between inputs and outputs which could be predetermined or estimated with least uncertainty.
2. (a) **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.
- (b) **ADL Matrix:** The ADL matrix which has derived its name from Arthur D. Little is a portfolio analysis method that is based on product life cycle. The approach forms a two dimensional matrix based on stage of industry maturity and the firms competitive position, environmental assessment and business strength assessment.
- (c) The corporate strategies a firm can adopt have been classified into four broad categories: stability, expansion, retrenchment, and combination known as directional/grand strategies. They are often called master or business strategies to provide basic direction for strategic actions toward achieving long-term business objectives.
- (d) **Synchro-marketing:** When the demand for the product is irregular causing idle capacity or over-worked capacities, synchro-marketing can be used to find ways to alter the pattern of demand so that it equates more suitably with the pattern of supply. It can be done through flexible pricing, promotion, and other incentives.
3. (a) **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.

- (b) TOWS Analysis is a variant of the classic business tool, SWOT Analysis. TOWS and SWOT are acronyms for different arrangements of the words Strengths, Weaknesses, Opportunities and Threats. By analyzing the external environment (threats and opportunities), and internal environment (weaknesses and strengths), we can use these techniques to think about the strategy of a company. Following are the some basic differences between TOWS and SWOT matrix:
- ◆ TOWS emphasises on external environment whereas SWOT emphasises on internal environment.
  - ◆ TOWS matrix is about the combinations of SO, ST, WO, WT whereas SWOT matrix is about S, W, O, T.
  - ◆ TOWS analysis is an action tool whereas SWOT analysis is a planning tool.
  - ◆ TOWS is particularly useful in evaluating the potential impact of sudden events or developments while SWOT is usually employed in evaluating a company's business plan.
- (c) Merger and acquisition in simple words are defined as a process of combining two or more organizations together.

Some organizations prefer to grow through mergers. Merger is considered to be a process when two or more companies come together to expand their business operations. In such a case the deal gets finalized on friendly terms and both the organizations share profits in the newly created entity. In a merger two organizations

combine to increase their strength and financial gains along with breaking the trade barriers.

When one organization takes over the other organization and controls all its business operations, it is known as acquisitions. In this process of acquisition, one financially strong organization overpowers the weaker one. Acquisitions often happen during recession in economy or during declining profit margins. In this process, one that is financially stronger and bigger establishes its power. The combined operations then run under the name of the powerful entity. A deal in case of an acquisition is often done in an unfriendly manner, it is more or less a forced association.

4. (a) A global strategy assumes more standardization of products across country boundaries. Under this strategy, the company tries to focus on a low cost structure by leveraging their expertise in providing certain products and services and concentrating the production of these standard products and services at a few favourable locations around the world. Competitive strategy is centralized and controlled by the home office.
  - (b) Corporate culture refers to a company's values, beliefs, business principles, traditions, ways of operating and internal work environment. Every corporation has a culture that exerts powerful influences on the behaviour of managers.
  - (c) Value chain analysis refers to separate activities which are necessary to underpin an organization's strategies and are linked together both within and around 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.
  - (d) In Co-generic merger two or more merging organizations are associated in some way or the other related to the production processes, business markets, or basic required technologies. Such merger includes the extension of the product line or acquiring components that are required in the daily operations. It offers great opportunities to businesses to diversify around a common set of resources and strategic requirements. For example, organization in the white goods categories such as refrigerators can diversify by merging with another organization having business in kitchen appliances.
5. (a) **Business environment in which an organization exists can be broadly divided into two parts:** the external and the internal. Since the environment is complex and has multiple elements, classification helps to understand it better. External environmental factors are largely beyond the control of individual enterprise and are dynamic in the sense that they keep on changing. These are technological, physical, political and socio-cultural. Internal environment is the environment that has a direct impact on the business and is within the control of the businesses. These are internal management, machinery, methods of production, etc.
  - (b) Liquidation as a form of retrenchment strategy is considered as the most extreme and unattractive. It involves closing down a firm and selling its assets. It is considered as the



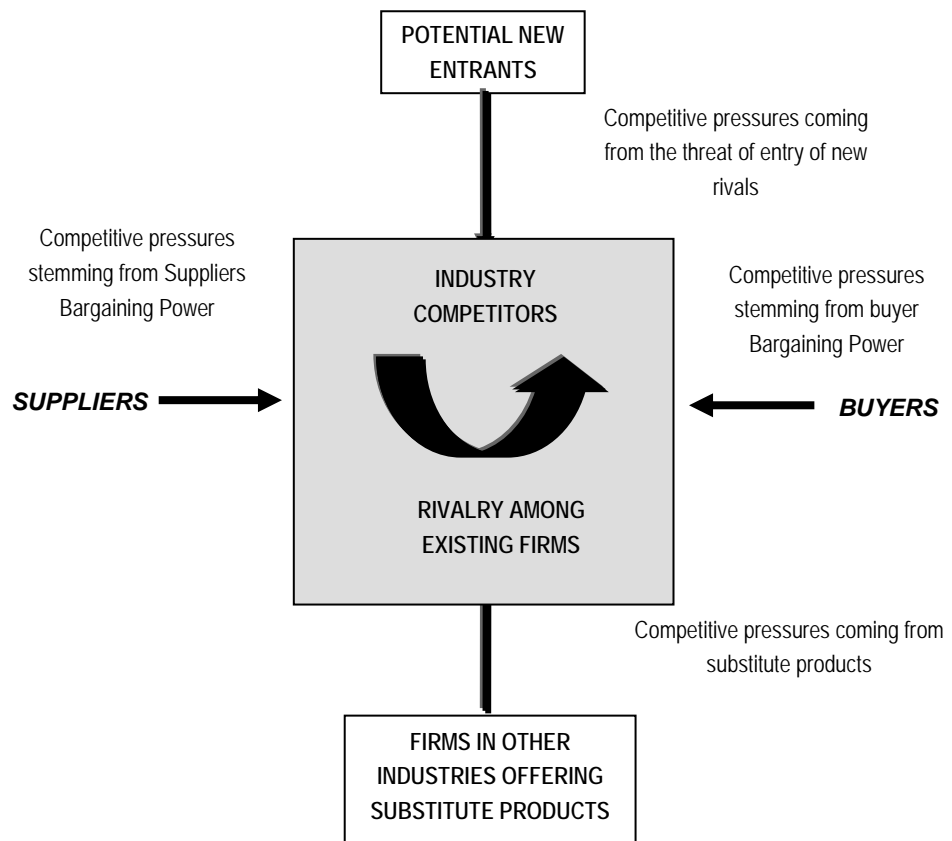
last resort because it leads to serious consequences such as loss of employment for workers and other employees, termination of opportunities a firm could pursue, and the stigma of failure. The company management, government, banks and financial institutions, trade unions, suppliers, creditors, and other agencies are extremely reluctant to be part of such a decision, or ask, for liquidation.

- (c) Turnaround is needed when an enterprise's performance deteriorates to a point that it needs a radical change of direction in strategy, and possibly in structure and culture as well. It is a highly targeted effort to return an organization to profitability and increase positive cash flows to a sufficient level. It is used when both threats and weaknesses adversely affect the health of an organization so much that its basic survival is difficult.

The overall goal of turnaround strategy is to return an underperforming or distressed company to normalcy in terms of acceptable levels of profitability, solvency, liquidity and cash flow. To achieve its objectives, turnaround strategy must reverse causes of distress, resolve the financial crisis, achieve a rapid improvement in financial performance, regain stakeholder support, and overcome internal constraints and unfavourable industry characteristics.

- (d) Network structure is a newer and somewhat more radical organizational design. The network structure could be termed a "non-structure" as it virtually eliminates in-house business functions and outsource many of them. An organisation organized in this manner is often called a virtual organization because it is composed of a series of project groups or collaborations linked by constantly changing non-hierarchical, cobweb-like networks. The network structure becomes most useful when the environment of a firm is unstable and is expected to remain so. Under such conditions, there is usually a strong need for innovation and quick response. Instead of having salaried employees, it may contract with people for a specific project or length of time. Long-term contracts with suppliers and distributors replace services that the company could provide for itself.
6. Five forces model of Michael Porter is a powerful and widely used tool for systematically diagnosing the significant competitive pressures in the market and assessing their strength and importance. The model holds that the state of competition in an industry is a composite of competitive pressures operating in five areas of the overall market. These five forces are:
1. **Threat of new entrants:** New entrants are a powerful source of competition. The new capacity and product range they bring in throw up new competitive pressures. The bigger the new entrant, the more severe the competitive effect. New entrants also place a limit on prices and affect the profitability of existing players.
  2. **Bargaining power of customers:** This is another force that influences the competitive condition of the industry. This force will become heavier depending on the possibilities of the buyers forming groups or cartels. The bargaining power of the buyers influences not only the prices that the producer can charge but also influences in many cases, costs and investments of the producer because powerful buyers usually bargain for better services which involve costs and investment on the part of the producer.

3. **Bargaining power of suppliers:** Quite often suppliers, too, exercise considerable bargaining power. The more specialised the offering from the supplier, greater is his clout. And, if the suppliers are also limited in number they stand a still better chance to exhibit their bargaining power. The bargaining power of suppliers determines the cost of raw materials and other inputs of the industry and, therefore, industry attractiveness and profitability.
4. **Rivalry among current players:** The rivalry among existing players is quite obvious. This is what is normally understood as competition. For any player, the competitors influence strategic decisions at different strategic levels. The impact is evident more at functional level in the prices being changed, advertising, and pressures on costs, product and so on.
5. **Threats from substitutes:** Substitute products are a latent source of competition in an industry. In many cases they become a major constituent of competition. Substitute products offering a price advantage and/or performance improvement to the consumer can drastically alter the competitive character of an industry. And they can bring it about all of a sudden.



7. Technology is the most dynamic of all the environmental factors. An individual enterprise is concerned with the dynamics of its product and process technology, research and development activities in the industry and elsewhere, innovations in products and processes, technological obsolescence and so on. Changes in technology vitally affect the costs, profitability, plant location decisions, product lines, growth and development.

The technology and business are highly interrelated and interdependent. Technology is patronized by business. Technology also drives business and makes a total change on how it is carried out.

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. New entrants or existing competitors can always use availability of technological improvements in products or production methods that can be a threat to a business.

Technological opportunities and threats are not limited to the product or production. Technology permeates whole gambit of business. It can transform how a business acts and functions.

8. 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 initiating whatever corrective adjustments in the vision, objectives, strategy, and execution are deemed appropriate.

The basic framework of strategic process can be described in a sequence of five stages as follows:

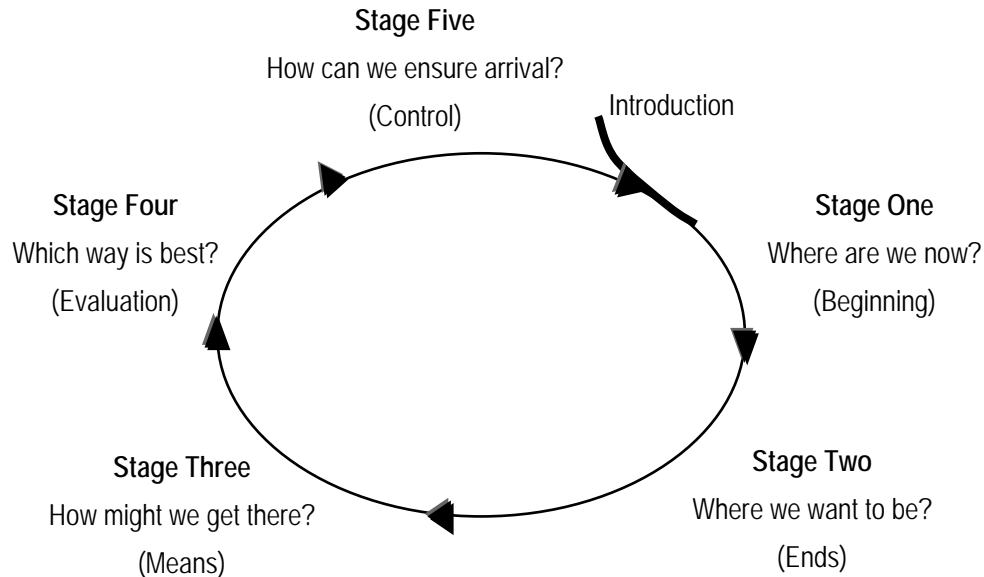
**Stage one** - Where are we now? (Beginning): This is the starting point of strategic planning and consists of doing a situational analysis of the firm in the environmental context.

**Stage two** - Where we want to be? (Ends): This is a process of goal setting for the organization after it has finalised its vision and mission.

**Stage three** - How might we get there? (Means): Here the organization deals with the various strategic alternatives it has.

**Stage four** - Which way is best? (Evaluation): Out of all the alternatives generated in the earlier stage the organization selects the best suitable alternative in line with its SWOT analysis.

**Stage five** - How can we ensure arrival? (Control): This is a implementation and control stage of a suitable strategy. Here again the organization continuously does situational analysis and repeats the stages again.



**Figure - Framework of strategic management**

9. Yes, strategy is partly proactive and partly reactive. In proactive strategy, organizations will analyze possible environmental scenarios and create strategic framework after proper planning and set procedures and work on these strategies in a predetermined manner. However, in reality no company can forecast both internal and external environment exactly. Everything cannot be planned in advance. It is not possible to anticipate moves of rival firms, consumer behaviour, evolving technologies and so on.

There can be significant deviations between what was visualized and what actually happens. Strategies need to be attuned or modified in light of possible environmental changes. There can be significant or major strategic changes when the environment demands. Reactive strategy is triggered by the changes in the environment and provides ways and means to cope with the negative factors or take advantage of emerging opportunities.

10. The model has been used by General Electric Company (developed by GE with the assistance of the consulting firm McKinsey & Company) known as "Stop-Light" Strategy Model. This model is also known as Business Planning Matrix, GE Nine-Cell Matrix and GE Model. The strategic planning approach in this model has been inspired from traffic control lights. The lights that are used at crossings to manage traffic are: green for go, amber or yellow for caution, and red for stop. This model uses two factors while taking strategic decisions: Business Strength and Market Attractiveness. The vertical axis indicates market attractiveness and the horizontal axis shows the business strength in the industry. The market attractiveness is measured by a number of factors like:

- Size of the market.
- Market growth rate.
- Industry profitability.
- Competitive intensity.
- Availability of Technology.
- Pricing trends.
- Overall risk of returns in the industry.
- Opportunity for differentiation of products and services.
- Demand variability.
- Segmentation.
- Distribution structure (e.g. retail, direct, wholesale) etc.

Business strength is measured by considering the typical drivers like:

- Market share.
- Market share growth rate.
- Profit margin.
- Distribution efficiency.
- Brand image.
- Ability to compete on price and quality.
- Customer loyalty.
- Production capacity.
- Technological capability.
- Relative cost position.
- Management caliber, etc.

		<i>Business Strength</i>		
		<i>Strong</i>	<i>Average</i>	<i>Weak</i>
Market Attractiveness	<i>High</i>			
	<i>Medium</i>			
	<i>Low</i>			

Figure : The GE Portfolio Matrix

<u>Zone</u>		<u>Strategic Signals</u>
Green		<i>Invest/Expand</i>
Yellow		<i>Select/Earn</i>
Red		<i>Harvest/Divest</i>

If a product falls in the green section, the business is at advantageous position. To reap the benefits, the strategic decision can be to expand, to invest and grow. If a product is in the amber or yellow zone, it needs caution and managerial discretion is called for making the strategic choices. If a product is in the red zone, it will eventually lead to losses that would make things difficult for organisations. In such cases, the appropriate strategy should be retrenchment, divestment or liquidation.

11. Industry and competitive analysis can be done using a set of concepts and techniques to get a clear understanding of 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. The factors that can be analysed are:

#### **Dominant economic features of the industry**

Industries differ significantly in their basic character and structure. Industry and competitive analysis begins with an overview of the industry's dominant economic features. The factors to consider in profiling an industry's economic features are market size, scope of competitive rivalry (local, regional, national, international, or global), market growth rate and position in the business life, number of rivals and their relative sizes, number of buyers and their relative sizes and so on.

#### **Nature and strength of competition**

An important component of industry and competitive analysis is to identify what the main sources of competitive pressure are and how strong each competitive force is. This analytical step is essential because managers cannot devise a successful strategy without in-depth understanding of the industry's competitive character. Even though competitive pressures in various industries are never precisely the same, the competitive process works in a similar fashion to use a common analytical framework in gauging the nature and intensity of competitive forces.

**Triggers of change**

An industry's economic features and competitive structure say a lot about its fundamental character but little about the ways in which its environment may be changing. All industries are characterized by trends and new developments that gradually produce changes important enough to require a strategic response.

**Identifying the companies that are in the strongest/weakest positions**

The next step in examining the industry's competitive structure is to study the market positions of rival companies. One technique for revealing the competitive positions of industry participants is strategic group mapping, which is useful analytical tool for comparing the market positions of each firm separately or for grouping them into like positions when an industry has so many competitors that it is not practical to examine each one in depth.

**Likely strategic moves of rivals**

Unless a company pays attention to what competitors are doing, it ends up flying blind into competitive battle. A company can't expect to outmanoeuvre its rivals without monitoring their actions, understanding their strategies, and anticipating what moves they are likely to make next. Competitive intelligence about the strategies rivals are deploying, their latest moves, their resource strengths and weaknesses, and the plans they have announced is essential to anticipating the actions they are likely to take next and what bearing their moves might have on a company's own best strategic moves.

**Key factors for competitive success**

Key Success Factors (KSFs) are those things that most affect industry members' ability to prosper in the marketplace - the particular strategy elements, product attributes, resources, competencies, competitive capabilities, and business outcomes that spell the difference between profit and loss and, ultimately, between competitive success or failure. KSFs by their very nature are so important that all firms in the industry must pay close attention to them.

**Prospects and financial attractiveness of industry**

The final step of industry and competitive analysis is to use the results of analysis of previous six issues to draw conclusions about the relative attractiveness or unattractiveness of the industry, both near-term and long-term. Strategists are obligated to assess the industry outlook carefully, deciding whether industry and competitive conditions present an attractive business opportunity for the company or whether the company's growth and profit prospects are gloomy.

12. Strategies provide an integral framework for management and negotiate their way through a complex and turbulent external environment. Strategy seeks to relate the goals of the organisation to the means of achieving them.

Strategy may be defined as a long range blueprint of an organisation's desired image, direction and destination what it wants to be, what it wants to do and where it wants to go. Strategy is meant to fill in the need of organisations for a sense of dynamic direction, focus and cohesiveness.

### The Generic Strategies

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

- (i) **Stability strategies:** One of the important goals of a business enterprise is stability to safeguard its existing interests and strengths, to pursue well established and tested objectives, to continue in the chosen business path, to maintain operational efficiency on a sustained basis, to consolidate the commanding position already reached, and to optimise returns on the resources committed in the business.
  - (ii) **Expansion Strategy:** Expansion strategy is implemented by redefining the business by adding the scope of business substantially increasing the efforts of the current business. Expansion is a promising and popular strategy that tends to be equated with dynamism, vigor, promise and success. Expansion includes diversifying, acquiring and merging businesses.
  - (iii) **Retrenchment Strategy:** A business organisation can redefine its business by divesting a major product line or market. Retrenchment or retreat becomes necessary for coping with particularly hostile and adverse situations in the environment and when any other strategy is likely to be suicidal. In business parlance also, retreat is not always a bad proposition to save the enterprise's vital interests, or even to regroup and recoup the resources before a fresh assault and ascent on the growth ladder is launched.
  - (iv) **Combination Strategies:** Stability, expansion or retrenchment strategies are not mutually exclusive. It is possible to adopt a mix to suit particular situations. An enterprise may seek stability in some areas of activity, expansion in some and retrenchment in the others. Retrenchment of ailing products followed by stability and capped by expansion in some situations may be thought of. For some organisations, a strategy by diversification and/or acquisition may call for a retrenchment in some obsolete product lines, production facilities and plant locations.
13. A typical external analysis will emerge with dozens of strategic uncertainties. To be manageable, they need to be grouped into logical clusters or themes. It is then useful to assess the importance of each cluster in order to set priorities with respect to Information gathering and analysis.

Sometimes the strategic uncertainty is represented by a future trend or event that has inherent unpredictability. Information gathering and additional analysis will not be able to reduce the uncertainty. In that case, scenario analysis can be employed. Scenario



analysis basically accepts the uncertainty as given and uses it to drive a description of two or more future scenarios. Strategies are then developed for each. One outcome could be a decision to create organizational and strategic flexibility so that as the business context changes the strategy will adapt.

14. There are at least three major R&D approaches for implementing strategies. The first strategy is to be the first firm to market new technological products. This is a glamorous and exciting strategy but also a dangerous one. Firms such as 3M and General Electric have been successful with this approach, but many other pioneering firms have fallen, with rival firms seizing the initiative.

A second R&D approach is to be an innovative imitator of successful products, thus minimizing the risks and costs of start up. This approach entails allowing a pioneer firm to develop the first version of the new product and to demonstrate that a market exists. Then, laggard firms develop a similar product. This strategy requires excellent R&D personnel and an excellent marketing department.

A third R&D strategy is to be a low-cost producer by mass-producing products similar to but less expensive than products recently introduced. As a new product accepted by customers, price becomes increasingly important in the buying decision. Also, mass marketing replaces personal selling as the dominant selling strategy. This R&D strategy requires substantial investment in plant and equipment, but fewer expenditures in R&D than the two approaches described earlier.

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. Management of organization's value chain or linkages provide 'leverage' and levels of performance which are difficult to match. The ability to co-ordinate the activities of specialist teams or departments may create competitive advantage through improving value for money in the product or service. Specialization of roles and responsibilities is common in most organizations and is one way in which high levels of competence in separate activities is achieved. However, it often results in a set of activities which are incompatible – different departments pulling in different directions - adding overall cost and/or diminishing value in the product or service.

This management of internal linkages in the value chain could create competitive advantage in a number of ways:

- There may be important linkages between the primary activities. For example, a decision to hold high levels of finished stock might ease production scheduling problems and provide for a faster response time to the customer. However, it will probably add to the overall cost of operations. An assessment needs to be made of whether the value added to the customer by this faster response through holding stocks is greater than the added cost.
- It is easy to miss this issue of managing linkages between primary activities in an analysis if, for example, the organization's competences in marketing activities and operations are assessed separately. The operations may look good because they are geared to high-volume, low-variety, low-unit-cost production. However, at the same time, the marketing team may be selling speed, flexibility and variety to the customers. So high levels of competence in separate activities are not enough if, as here, the competences are incompatible: that is, they are not related to the same view of what value for money means to the customer.
- The management of the linkages between a primary activity and a support activity may be the basis of a core competence. It may be key investments in systems or infrastructure which provides the basis on which the company outperforms competition. Computer-based systems have been exploited in many different types of service organization and have fundamentally transformed the customer experience.

- Linkages between different support activities may also be the basis of core competences. For example, the extent to which human resource development is in tune with new technologies has been a key feature in the implementation of new production and office technologies. Many companies have failed to become competent in managing this linkage properly and have lost out competitively.

In addition to the management of internal linkage, competitive advantage may also be gained by the ability to complement/co-ordinate the organization's own activities with those of suppliers, channels or customers. Again, this could occur in a number of different ways:

- Vertical integration attempts to improve performance through ownership of more parts of the value system, making more linkages internal to the organization. However, the practical difficulties and costs of co-ordinating a wider range of internal activities can outweigh the theoretical benefits.
  - Within manufacturing industry the competence in closely specifying requirements and controlling the performance of suppliers (sometimes linked to quality checking and/or penalties for poor performance) can be critical to both quality enhancement and cost reduction.
17. Strategy implementation concerns the managerial exercise of putting a freshly chosen strategy into place. Strategy execution deals with the managerial exercise of supervising the ongoing pursuit of strategy, making it work, improving the competence with which it is executed and showing measurable progress in achieving the targeted results. Strategic implementation is concerned with translating a decision into action, with presupposes that the decision itself was made with some thought being given to feasibility and acceptability.

It is crucial to realize the difference between strategy formulation and strategy implementation because they both require very different skills. Also, a company will be successful only when the strategy formulation is sound and implementation is excellent. There is no such thing as successful strategic design. This sounds obvious, but in practice the distinction is not always made. The matrix in the figure below represents various combinations of strategy formulation and implementation:

Strategy formulation	Sound	<i>A</i>	<i>B</i> (Success)
	Flawed	<i>C</i>	<i>D</i>
		Weak	Excellent
		Strategy implementation	

18. 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.

TQM is a total system approach (not a separate area or program) and an integral part of high-level strategy. It works horizontally across functions and departments, involves all employees, top to bottom, and extends backward and forward to include the supply chain and the customer chain. TQM stresses learning and adaptation to continual change as keys to organizational success.

#### **Principles guiding TQM**

Implementing TQM requires organization wide support. There are several principles that guide success of TQM. Various principles that guide the total quality management philosophy are as follows:

- A sustained management commitment to quality
  - Focusing on the customer
  - Preventing rather than detecting defects
  - Universal quality responsibility
  - Quality measurement
  - Continuous improvement and learning
  - Root cause corrective action
  - Employee involvement and empowerment
  - The synergy of teams
  - Thinking statistically
  - Inventory reduction
  - Value improvement
  - Supplier teaming
  - Training
19. The impact of the Internet and the rapidly emerging e-commerce environment is substantial and widespread. The advent of the Internet and online networks is changing everything. Growing use of the Internet by businesses and consumers reshapes the economic landscape and alters traditional industry boundaries. Characteristics of E-commerce environment changing competitive scenario are as under:
- (a) The Internet makes it feasible for companies everywhere to compete in global markets. This is true especially for companies whose products are of good quality and can be shipped economically.

- (b) There are new e-Commerce strategic initiatives of existing rivals and new entrants in form of e-commerce rivals. The innovative use of the Internet adds a valuable weapon to the competitive arsenal of rival sellers, giving them yet another way to jockey for market position and manoeuvre for competitive advantage.
- (c) Entry barriers into the e-commerce world are relatively low. Relatively low entry barriers explain why there are already hundreds of thousands of newly formed e-commerce firms, with perhaps millions more to spring up around the world in years to come. In many markets and industries, entry barriers are low enough to make additional entry both credible and likely.
- (d) Increased bargaining power of customers to compare the products, prices and other terms and conditions of rival vendors. Online buyers gain bargaining power because they confront far fewer obstacles to comparing the products, prices, and shipping times of rival vendors.
- (e) Possibility for business organizations to locate the best suppliers across the world to gain cost advantage. The Internet makes it feasible for companies to reach beyond their borders to find the best suppliers and, further, to collaborate closely with them to achieve efficiency gains and cost savings. Organisations can extend their geographic search for suppliers and can collaborate electronically with chosen suppliers to systemise ordering and shipping of parts and components, improve deliveries and communicate speedily and efficiently.
- (f) Internet and PC technologies are advancing rapidly, often in uncertain and unexpected directions. There has been wide acceptance of new technologies such as tablets and smart phones. These devices have improved the availability of the internet creating new avenues for the business. Such changes are often bringing in new opportunities and challenges.
- (g) Faster diffusion of new technology and new idea across the world. Organisations in emerging countries and elsewhere can use the internet to monitor the latest technological developments and to stay abreast of what is transpiring in the developed markets.
- (h) The e-commerce environment demands that companies move swiftly. In the exploding e-commerce world, speed is a condition of survival. New developments occur on one front and then on another occur regularly.
- (i) E-commerce technology opens up a host of opportunities for reconfiguring industry and company value chains. Using the internet to link the orders of customers with the suppliers of components enables just-in-time delivery to manufacturers, slicing inventory costs and allowing production to match demand.
- (j) The Internet can be an economical means of delivering customer service. Organisations are discovering ways to deliver service in a centralised manner –

online or through telephone. Thus curtailing the need to keep company personnel at different locations or at the facilities of major customers.

- (k) The capital for funding potentially profitable e-commerce businesses is readily available. In the Internet age, e-commerce businesses have found it relatively easy to raise capital. Venture capitalists are quite willing to fund start-up enterprises provided they have a promising technology or idea, an attractive business model, and a well thoughtout strategic plan.
- (l) The needed e-commerce resource in short supply is human talent-in the form of both technological expertise and managerial know-how. While some e-commerce companies have their competitive advantage lodged in patented technology or unique physical assets or brand-name awareness, many are pursuing competitive advantage based on the expertise and intellectual capital of their personnel and on their organizational competencies and capabilities.