

PAPER – 6 : INFORMATION TECHNOLOGY AND STRATEGIC MANAGEMENT

SECTION – A : INFORMATION TECHNOLOGY

QUESTIONS

1. Define the following terms briefly:

(i) Touch Screen	(ii) Control Bus
(iii) Throughput	(iv) Motherboard
(v) Expansion Slot	(vi) Processor Register
(vii) Flash Memory	(viii) Blu-ray disc
(ix) Digitizing Tablets	(x) MIDI
(xi) Speaker	(xi) Overlaying
(xiii) Time Sharing	(xiv) Device Drivers
(xv) Spooling Software	(xvi) Unicode
(xvii) Bit	(xviii) Data Type
(xix) Index Field	(xx) Random Access
(xxi) Secondary Key	(xxii) Disk Manager
(xxiii) Dbspaces	(xxiv) Transaction Log
(xxv) Metadata	(xxvi) VPN
(xxvii) Protocol Converter	(xxviii) ISDN
(xxix) Intrusions Detection System(IDS)	(xxx) Firewall
(xxxi) WWW	(xxxii) HTTP
(xxxiii) TCP/IP	(xxxiv) Bluetooth
(xxxv) Wi-Fi technology	
2. Convert the following from one number system to another number system along with the working notes:

(i) $(10011001)_2$	=	$()_{10}$
(ii) $(5250)_{10}$	=	$()_2$
(iii) $(455.50)_{10}$	=	$()_2$
(iv) $(11001.1001)_2$	=	$()_{10}$
3. Distinguish between the following:
 - (i) RAM and ROM
 - (ii) Digital Video Disk (DVD) and Magneto-Optical Disk
 - (iii) Parallel Port and Serial Port

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- (iv) DAS, NAS and SAN
- (v) Inkjet printer and Laser printer
- (vi) Third Generation (3GLs) and Fourth Generation (4GLs) Language
- (vii) Multi-threading and Multi-programming
- (viii) Conceptual view and Internal view
- (ix) Distributed Database Model and E-R Database Model
- (x) Serial transmission and Parallel transmission
- (xi) Star topology and Ring topology
- (xii) Proxy server and Chat server
- (xiii) Intranet and Extranet
- (xiv) Electronic cheque and Electronic purses

Generation and Classification of Computers

4. (a) Discuss the general characteristics of 1st and 2nd generations of Computers.
(b) Based on working principle, discuss various categories of computers.

Floppy Disk and Magnetic Disk

5. (a) Discuss how data is organized on a Floppy Disk.
(b) What are the advantages and disadvantages of Direct Access storage? Discuss.

Case Study

6. Refer to Case Study1 (The Xerox PeopleNet Story- Use of Information Technology in Business Organisation) of Unit 1 of Chapter 1 i.e “Introduction to Computers”. Give suitable answer to the following questions.
 - (a) What made Xerox Co. Ltd. to think about the possibilities of using a computer system to release HR professionals from monotony of administrative task? Discuss in brief.
 - (b) Was existing infrastructure enough to implement HRMS? Explain in detail the approach adopted by Xerox Co. Ltd. with respect to hardware and software implementation.
 - (c) What benefits Xerox PeopleNet could deliver that were not possible through existing system. Explain in brief.

Direct Data Entry

7. What is image processing? Describe the steps involved to document imaging. Discuss the advantages of image processing.

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Computer Output

8. (a) What do you understand by Video Display Terminal (VDT). Discuss the advantages and limitations of CRT, LCD and Plasma display devices.
- (b) Discuss the factors that influence the purchase of good quality printers.

Operating System

9. (a) Explain the term "Operating Systems" ? What are the basic functions of Operating System.
- (b) Write the flavours of Windows Operating System in brief.

Case Study

10. Refer to Case Study1 (Automated Scoring of General Assessment Test for Students) of Unit 2 of Chapter 1 i.e "Introduction to Computers". Give suitable answer to the following questions.
- (a) Discuss in brief, the key challenges faced by the teacher in the design of large scale assessments programs.
- (b) Explain the process that has been implemented for accurate, cost effective and timely assessment of the answer sheets.

Application Software

11. (a) What do you understand by Decision Support Systems? Describe various characteristics of a DSS.
- (b) Explain the various components of a Decision Support System.

Database

12. (a) What do you understand by Database? Discuss various parts of DBMS in brief.
- (b) Discuss the benefits of using DBMS.

Database Administrator and SQL

13. (a) What are the roles and responsibilities of the Database Administrator? Discuss in brief.
- (b) What is SQL? Discuss various elements which are used to form the SQL statements.

Case Study

14. Refer to Case Study1 (Godrej's Data Warehousing Initiative: A Warehouse of Value) of Chapter 2 i.e "Data Storage, Retrieval and Data Base Management Systems". Give suitable answer to the following questions.

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What prompted Godrej to use data warehousing tools? What are the benefits which were achieved by implementation of such tools?

Transmissions Protocol

15. (a) What do you understand by transmission protocols? Discuss various aspects of transmission protocols.
- (b) Explain the OSI model of communications in brief.

Business Continuity Planning

16. Explain Business Continuity Planning life cycle in detail.

Internet & E-commerce

17. (a) What is Internet? Discuss intrinsic benefits of the Internet.
- (b) Describe the benefits offered by E-commerce applications.

Supply Chain Management

18. (a) What is Supply Chain Management? Discuss the broad areas where the SCM can be implemented.
- (b) What is a Bullwhip effect in Supply Chain Management? Discuss the factors contributing to the Bullwhip effect.

Flowchart

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

Code No.	Type of Goods	Tax Rate
1	Perishable	15%
2	Textiles	10%
3	Luxury Items	20%
4	Machinery	12%

Decision table

20. While invoicing each customer, the invoice clerk has to work out the discounts allowable on each order. Any order over Rs. 20,000 attracts a “bulk” discount of 8%. A customer within the trade is allowed 10%. There is also a special discount of 5% allowed for any customer who has been ordering regularly for over 5 years.

Draw a decision table to illustrate the clerical procedure for working out this management policy.

SUGGESTED ANSWERS/HINTS

1. (i) **Touch Screen:** It is used in information providing systems. It consists of a screen which is lined with light emitting devices on its vertical sides and photo-detectors are placed on the horizontal sides. When the user's finger approaches the screen, the light beam is broken and is detected by the photo detectors. It is more effect than the mouse.
- (ii) **Control Bus :** A control bus is a computer bus, used by CPU to direct and monitor the actions of the other functional areas of the computer. It is used to transmit a variety of individual signals (read, write, interrupt, acknowledge, and so forth) necessary to control and coordinate the operations of the computer.
- (iii) **Throughput:** It is the rate at which information can be read from or written to the storage. In computer storage, throughput is usually expressed in terms of megabytes per second or MBs, though bit rate may also be used. As with latency, read rate and write rate may need to be differentiated.
- (iv) **Motherboard:** The motherboard or the system board is the main circuit board on the computer. It acts as a direct channel for the various components to interact and communicate with each other. There are various types of motherboards available depending on the processors that are used.
- (v) **Expansion Slot:** An expansion slot expand the computer's functionality by allowing for plugging in expansion cards built to perform specific functions. These are used to built-in devices such as hard disks and diskette drives access to the computer's bus via controller cards. It also provide I/O (input/output) ports on the back of the computer for external devices such as monitors, external modems, printers, and the mouse and gives special-purpose devices access to the computer.
- (vi) **Processor Register :** They are internal to the central processing unit. These registers contain information that the arithmetic and logic unit needs to carry out the current instruction. They are technically the fastest of all forms of computer storage, being switching transistors integrated on the CPU's silicon chip, and functioning as electronic "flip-flops".
- (vii) **Flash Memory:** Flash memory chips are a form of static RAM (SRAM) chips, which store data much like those used in the computer's primary storage. It is non-volatile computer storage technology through which data can be erased electrically and reprogrammed. However, the data stays recorded even when the power is turned off. Since flash memory is non-volatile, no power is needed to maintain the information stored in the chip. In addition, flash memory offers fast read access times and better kinetic shock resistance than hard disks.
- (viii) **Blu-ray Disc :** It is the name of a next-generation optical disc format to enable recording, rewriting and playback of high-definition video (HD), as well as storing large amount of data. The format offers more than five times the storage

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capacity of traditional DVDs and can hold up to 25 GB on a single-layer disc and 50 GB on a dual-layer disc. This extra capacity combined with the use of advanced video and audio codes that will offer consumers an unprecedented HD experience.

- (ix) **Digitizing Tablets:** It is also known as graphics tablet which is a computer input device that allows hand-draw images and graphics, similar to the way one draws images with a pencil and paper. These tablets may also be used to capture data or handwritten signatures. It can also be used to trace an image from a piece of paper which is taped or otherwise secured to the surface. Capturing data in this way, either by tracing or entering the corners of linear poly-lines or shapes is called digitizing.
- (x) **MIDI (Musical Instrument Digital Interface):** It is a system, designed to transmit information between electronic musical instruments. A MIDI musical keyboard can be attached to a computer and allow a performer to play music that is captured by the computer system as a sequence of notes with the associated timing (instead of recording digitized sound waves).
- (xi) **Speaker:** Speakers are key output systems attached to the computer which are similar to ones that are connected to a stereo. Speaker transfers a constantly changing electric current to a magnet, which pushes the speaker cone back and forth. The moving speaker cone creates pressure vibrations - in other words, sound. The sound card translates digital sounds into the electric current that is sent to the speakers. When the sound is played back, the sound card reverses this process, translating the series of numbers into electric current that is sent to the speakers.
- (xii) **Overlaying:** It is a process by which programs stored on disk are broken up into fixed-length pages. When a program needs to be processed, the first few pages of it are brought into primary memory. If the computer needs a page it does not have, it brings that page in from secondary storage and overwrites it onto the memory locations occupied by a page it no longer needs. Processing continues in this manner until the program finishes.
- (xiii) **Time-sharing:** Time sharing is a methodology created to satisfy the processing needs of multiprogramming and batch operating system. In time sharing systems, the execution time is divided into small slots called "time slice". Each process is processed for a time slice and then the other process is taken for processing by the processor. This process goes on till all the jobs are processed. The process of shifting a microprocessor from processing of one job to the other is so rapid that the user can't even notice it. Each user feels like the processor is dedicatedly processing his job only. The main objective of the time sharing systems is to reduce the response time.
- (xiv) **Device Drivers:** Device drivers are small files that act as an interface between hardware in a computer system and the operating system (OS). A driver typically communicates with the device through the computer bus or communications

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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.

- (xv) **Spooling Software:** The purpose of spooling software is to compensate for the speed differences between the computer and its peripheral devices. Spooling utilities can also be used on the input side, so that programs and data to be processed are temporarily stored in an input spooling area on disk.
- (xvi) **Unicode:** Unicode is a worldwide character code standard where 16-bits (2 bytes) are used to represent a single character or symbol. Using this code system, 65,536 different characters can be represented inside the computer. The first 256 codes in Unicode are identical to the 256 codes used by ASCII system. Unicode system is supported by the popular operating systems such as Windows 2000 and OS/2 and also supported by some applications.
- (xvii) **Bit:** A bit is abbreviation of binary digit of 0 or 1. It is defined as the smallest basic unit of storage in the computer memory that has value 0 or 1.
- (xviii) **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, floating point number, character, string, and pointer.
- (xix) **Index Field:** Index fields are used to store relevant information along with a documents. The data input to an index field is used to find those documents when needed. The program provides upto twenty five user definable index fields in an index set.
- (xx) **Random Access:** Random Access pertains to the method of file organization in a storage device in which the access time of the storage device is not significantly affected by the location of the data to be accessed. It means that any item of data which is stored online can be accessed within a relatively short time (usually in part of a second).
- (xxi) **Secondary Key:** Secondary keys can be defined for each table to optimize the data access that can refer to any column combination and they help to prevent sequential scans over the table. A candidate key which is not selected as a primary key is known as Secondary Key.
- (xxii) **Disk Manager :** It is a part of the Operating System, which carries out all physical input / output operations and transfers block / page requested by file manager.
- (xxiii) **Dbspaces:** 'Backup' and 'Recovery' are utility programs used to make a copy of the contents and restoring of database files and log files. The database files

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consist of a database root file, log file, mirror log file, and other database files called dbspaces.

- (xxiv) **Transaction Log:** A transaction log is a file that records database modifications such as insert, update, delete, commit, rollback and database schema changes. The database engine uses a transaction log to apply any changes made between the most recent checkpoint and the system failure.
- (xxv) **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.
- (xxvi) **VPN:** A VPN (Virtual Private Network) is a private network that uses a public network (usually the Internet) to connect remote sites or users together. It uses "virtual" connections routed through the Internet from the company's private network.
- (xxvii) **Protocol Converter :** Because an organization's network typically evolved over numerous years, it is often composed of a mixture of many types of computers, transmission channels, transmission modes, and data codes. A protocol converter enable diverse systems components to communicate with one another and to operate as a functional unit. Protocol conversion can be accomplished via hardware, software, or a combination of hardware and software.
- (xxviii) **ISDN:** Integrated Services Digital Network (ISDN) is a system of digital phone connections to allow simultaneous transmission of voice and data across the world. ISDN allows multiple digital channels to be operated simultaneously through the same regular phone cable meant for analog signals.
- (xxix) **Intrusion Detection System:** Intrusion Detection Systems (IDS) are used for detecting inappropriate, incorrect, or anomalous activity on the network from outside. ID systems can be host-based or network-based. They provide automated network-based security assessment and policy compliance evaluation.
- (xxx) **Firewall:** Firewalls are systems that control the flow of traffic between the Internet and the firm's internal LANs and systems. They are usually packaged as turnkey hardware/software packages, and are set up to enforce the specific security policies that are desired. A firewall is a proven, effective means of protecting the firm's internal resources from unwanted intrusion.
- (xxxi) **WWW :** It is a network of computers which communicates with each other using standard called HTTP. The World Wide Web (WWW) is most often called the Web. WWW is a component of the Internet that provides access to large amount of information located on many different servers. It also provides access to many of the services available on the Internet.

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- (xxxii) **HTTP:** Hyper Text Transfer Protocol provides access to large amount of information located on many different servers. The protocol that the Web uses for HTML codes for Web page is **HyperText Transport Protocol** (HTTP). For example, consider the web page address:

<http://www.skyline.com/1page.htm>

The **http://** specifies that HTTP will be used to process information to and from the Web server; pages **skyline.com** is the Web server's Internet address; and **1page.htm** is the address of the page on the server.

- (xxxiii) **TCP/IP :** It is a Internet protocol suite; provides set of communications protocols that implement the protocol stack on which the Internet and most commercial networks run. The Internet protocol suite — like many protocol suites — can be viewed as a set of layers; each layer solves a set of problems involving in transmission of data, and provides a well-defined service to the upper layer protocols based on using services from some lower layers.
- (xxxiv) **Bluetooth:** Bluetooth is a telecommunications industry specification that describes how mobile phones, computers, and personal digital assistants (PDAs) can be easily interconnected using a short-range wireless connection. Using this technology, users of cellular phones, pagers, and personal digital assistants can get quickly synchronized with information in a desktop or notebook computer, initiate the sending or receiving of a fax, initiate a print-out, and, in general, have all mobile and fixed computer devices be totally coordinated.
- (xxxv) **Wi-Fi Technology:** Wi-Fi stands for Wireless Fidelity that describes the underlying technology of wireless local area networks (WLAN) based on the IEEE 802.11 specifications. Wi-Fi was intended to be used for mobile computing devices, such as laptops, in LANs, but is now often used for increasingly more applications, including Internet and VoIP phone access, gaming, and basic connectivity of consumer electronics such as televisions and DVD players.

2. (i) $(10011001)_2 = (\quad)_{10}$

$$= 1 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 2^0$$
$$= 128 + 0 + 0 + 16 + 8 + 0 + 0 + 1$$

Thus, $(10011001)_2 = (153)_{10}$

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(ii) $(5250)_{10} = ()_2$

2	5250	Remainder
2	2625	0
2	1312	1
2	656	0
2	328	0
2	164	0
2	82	0
2	41	0
2	20	1
2	10	0
2	5	0
2	2	1
2	1	0
	0	1

Thus, $(5250)_{10} = (1010010000010)_2$

(iii) $(455.50)_{10} = ()_2$

To convert the given number from Decimal number system to Binary number system, first we will convert mantissa part, than the fractional part into Binary number system.

Step-I

2	455	Remainder
2	227	1
2	113	1
2	56	1
2	28	0
2	14	0
2	7	0
2	3	1
2	1	1
	0	1

$(455)_{10} = (111000111)_2$

Step-II

$50 \times 2 = 1.0$

So, $(455.50)_{10} = (111000111.1)_2$

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$$\begin{aligned} \text{(iv)} \quad (11001.1001)_2 &= (\quad)_{10} \\ &= 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 0 \times 2^{-2} + 0 \times 2^{-3} + 1 \times 2^{-4} \\ &= 16 + 8 + 0 + 0 + 1 + 1/2 + 0 + 0 + 1/16 \\ (11001.1001)_2 &= (25.56)_{10} \end{aligned}$$

3. (i) **Random-Access-Memory:** The memory system constructed with metal-oxide semi conductor storage elements that can be changed is called a Random Access Memory (RAM). The purpose of RAM is to hold programs and data while they are in use. It is called random access memory since access time in RAM is independent of the address of the word, that is, each storage location (address) inside the memory is as easy to reach as any other location and takes the same amount of time. RAM is volatile in nature and is extremely fast but can also be quite expensive. RAMs can be further divided according to the way in which the data is stored, into dynamic RAMs and static RAMs. The computer designer's decision which to use where depends on what their function is to be, and on their speed and cost.

Read-Only-Memory: Read-only-memory (ROM) is used for micro programs wherein the storage cannot be altered by regular program instructions. The information is stored permanently in such memory during their manufacturing and can be read only but fresh information cannot be written into it. One set of instructions found in ROM is called the ROM-BIOS which stands for Read-only Memory Basic Input Output services. These programs perform the basic control and supervisory operations for the computer. Its various types are: PROM, EPROM and EEPROM and also handles the basic needs of the hardware involved, which include all I/O devices.

- (ii) **Digital Video Disk:** DVD is an optical disc storage media format that can be used for data storage, including movies with high video and sound quality. A video disk can store text, video, and audio data. Video disks can be accessed a frame at a time (to provide still information) or played like a phonograph record (to supply up to an hour of moving action). Any of the 54,000 tracks on the surface of typical video disk can be accessed in about three seconds. DVD can store 4.7 gigabyte of data on a single-side and 17 gigabytes of data on a double-side of the disc. DVD-5, 9, 10 and 18 are the various types of DVDs can be used for storing images, text, movies, high resolution graphics etc. The advantages of DVDs are therefore self-evident – a huge storage capacity that enables users to archive large amount of data on a single, lightweight, removable, reliable, easily-transportable medium. Video disks are widely used for training applications.

Magneto-Optical Disks: Magneto-optical disk integrates optical and magnetic disk technology to enable read-write storage. MO diskette can store many times that amounts, ranging from 100 MB up to several gigabytes (GB). An MO system achieves its high data density by using a laser and a magnetic read/write head in combination. Both the laser and the magnet are used to write data onto the diskette. The laser heats up the diskette surface so it can be easily magnetized, and also to

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allow the region of magnetization to be precisely located and confined. A less intense laser issued to read data from the diskette. Data can be erased and/or overwritten an unlimited number of times, as with a conventional 3.5-inch diskette. MO discs come in 3.5" and 5.25" cartridges. The capacities of 3.5" cartridges are 128MB, 230MB, 640MB, 1.3GB and 5.25" cartridges are 650MB, 1.3GB, 2.6GB, 5.2GB, and 9.1GB.

- (iii) **Parallel Port:** A parallel port is a parallel communication physical interface. Parallel ports facilitate the parallel transmission of data, usually one byte (8 bits) at a time. It is also known as a printer port or Centronics port. The IEEE 1284 standard defines the bi-directional version of the port, which allows the transmission and reception of data bits at the same time. Parallel ports are used to connect external input/output devices like scanners or printers.

Serial Port: A serial port is a serial communication physical interface through which information transfers in or out one bit at a time. They are used for connecting communication devices like modems or other serial devices like mice. Serial ports are commonly still used in applications such as industrial automation systems, scientific analysis, shop till systems and some industrial and consumer products. Server computers may use a serial port as a control console for diagnostics. Network equipment (such as routers and switches) often use serial console for configuration. Serial port uses 25 pin RS-232 port.

- (iv) **Direct Attached Storage (DAS):** It is a network storage system on which data is saved to the server computer's internal hard drive. The network workstations access the server to connect to the storage. These files are saved directly onto the computer's disk space and can be readily pulled up at any time. This is the most commonly used means of network storage. The disadvantages of DAS include its inability to share data or unused resources with other servers.

Network Attached Storage (NAS): It is a type of network storage system that saves data onto another computer system attached to a group of computers through a network, or onto a special server attached to the network. A NAS device is typically a stand alone, high performance, single purpose system or component. It serves specific storage needs with its own operating system and integrated hardware and software. NAS devices are well suited to serve heterogeneous networks. The advantages of NAS over other methods of storage are performance and connectivity.

Storage Area Network (SAN): It is an architecture to attach remote computer data storage devices (such as disk arrays, tape libraries, and optical jukeboxes) to servers so the devices appear as locally attached to the operating system. A SAN typically has its own network of storage devices that are generally not accessible through the regular network by regular devices. SAN reduces data traffic and improves data access by using Fiber connections.

- (v) **Ink-Jet printer:** The Inkjet printer is non-impact character printer that prints one character at a time. The Inkjet printer has fine spray nozzles that create the image of character or graphics on the paper (without striking the paper) by spraying tiny or

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small drops of ink onto the paper. The print head of Inkjet printer contains ink filled print cartridges. Each cartridge has fifty to several hundreds small ink nozzles. Each nozzle in the printer cartridge is similar to an individual pin on a dot matrix printer. The combination of the nozzles is activated to form the shape of character or image on the paper. The printing quality of Inkjet printer is measured by the number of tiny ink drops per inch (dpi) it can spray. Most Inkjet printers range from 300 to 2400 DPI. Printers with higher DPI usually are more expensive but having high printing quality. The speed of an Inkjet printer is measured by the number of pages per minute (PPM) it can print. It has the capability to print 15 ppm. Inkjet printers are very quiet and provide laser-like quality at a much lower cost although supplies are relatively expensive.

Laser printer : It uses a combined system which utilizes laser and Xerographic photocopying technology. In a laser printer, a beam from a small laser scans horizontally across a charged xerographic selenium drum to build up an invisible electrostatic image of a whole page of text. Laser printer produces not only alphanumeric characters but also drawings, graphics and other requirements. Its output can be very close to professional printing quality. The laser printer prints a page at a time. A high-end fast color laser printer will have between 16 PPM and 26 PPM for color prints, and perhaps even higher for black-and-white prints. The resolution of laser printers is measured in dots per inch (DPI) ranges from 600 DPI to 2400 DPI.

(vi)

S.No.	Third-Generation Languages (3GLs)	Fourth-Generation Languages (4GLs)
1.	Intended for use by professional programmer.	May be used by a end user as well as a professional programmer.
2.	Require specification of how to perform the task.	Require specification of what task to perform (system determines how to perform the task).
3.	Require that all alternatives be specified	Have default alternatives built in; end user need not specify these alternatives.
4.	Require large number of procedural instructions.	Require far fewer instructions (less than one-tenth in most cases).
5.	Code may be difficult to read, understand and maintain.	Code is easy to understand and maintain because of English-like commands.
6.	Language developed originally for batch operation.	Language developed primarily for on-line use.
7.	Can be difficult to learn.	Many features can be learned quickly.
8.	Difficult to debug.	Errors easier to locate because of shorter programs, more structured code,

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		and use of defaults and English-like language.
9.	Typically file-oriented.	Typically data base oriented.

(vii) **Multi-threading:** It is defined as a separate process with several threads of control. A single application may be required to perform several similar tasks, such as process of client request for web pages, images, sound, and so forth. The multi-threading have one process that contains multiple threads to serve the same purpose. The operating system would create a separate thread that would listen for client requests when a request was made rather than creating another process, it would create another thread to service the request. Multithreading provides advantages like responsiveness, resource sharing economy and utilization of multiprocessor architectures that can be used in client-server environment. Multithreading allows a process to keep running even if some threads within the process are stalled, working on a lengthy task, or awaiting user interaction, thus improve the performance of processing the task.

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

(viii) **Global or Conceptual view contains the following-**

- (i) Single view represents the entire database,
- (ii) It is defined by the conceptual schema,
- (iii) It describes all records, relationships and constraints or boundaries,
- (iv) Data description to render it independent of the physical representation.

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

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- (ix) **Distributed Database Model:** Distributed Databases employs the processing is distributed, hence, the data to be processed must be located at the processing site. This means that the database or parts of the database must be distributed. Distributed database systems usually reduce costs for an organization because they reduce transfer of data between remote sites and the organization headquarters. Distributed database systems may also provide organizations with faster response times for filling orders, answering customer requests or providing managers with information. However, distributed systems sometimes compound the problem of control over the database, increase problems of security, increase data redundancy resulting in danger to data integrity.

E-R Database Model : An E-R model is a specialized graphic that illustrates the interrelationships between entities in a database. It is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema of a system. The entity is defined as a distinguishable object that exists in isolation and is described by a set of attributes. An entity may be a physical object such as a house or a car, an event such as a house sale or a car service, or a concept such as a customer transaction or order. A relationship is the association among several entities. Entities and relationships can both have attributes. An attribute is a data element that describes an entity. The set of all entities or relationships of the same type is called the entity set or relationship set. The degree of relationship indicates the link between the two entities for a specified occurrence of each. The degree of relationship is also called "Cardinality". Cardinality specifies how many instances of an entity relate to one instance of another entity.

- (x) **Serial transmission and Parallel transmission :**

S.No	SERIAL TRANSMISSION	PARALLEL TRANSMISSION
1	In this, the data bits are transmitted serially one after another.	In this, the data bits are transmitted simultaneously.
2	Data is transmitted over a single wire.	Data is transmitted over 8 different wires.
3	It is a cheaper mode of transferring data.	It is relatively expensive.
4	It is applicable for long distance data transmissions.	It is not practical for long distance communications as it uses parallel path, so cross talk may occur.
5	It is relatively slower.	It is relatively faster.

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(xi) Star topology and Ring topology

S.NO.	Star topology	Ring topology
1	Processing nodes interconnect directly with a central system. Each node can communicate only with the central site and not with other nodes in the network.	Processing nodes are connected in the form of a loop or ring. There is a direct unidirectional point-to-point link between two neighboring nodes.
2	A node can transmit information to other node by sending the details to the central node, which in turn sends them to the destination.	Since the links are unidirectional, transmission by a node traverses the whole ring and comes back to the node, which made the transmission.
3.	It is easy to add or remove computers.	Adding or removing computers can disrupt the entire network.
4.	A node failure does not bring down the entire network, but if the central hub fails, the whole network ceases to function.	A node failure can affect the whole network.
5.	It is easier to diagnose network problems.	It is difficult to troubleshoot a ring network through the central hub.

(xii) Proxy server: A proxy server is designed to restrict access to information on the Internet. A proxy server operates on a list of rules given to it by a System Administrator. Some proxy software uses list of specific forbidden sites, while other proxy software examines the content of a page before it is served to the requester. If certain keywords are found in the requested page, access to it is denied by the proxy server. Certain types of information can be restricted or prohibited by using proxy server.

Chat server: It allows multiple users to have "real-time" discussions, called "chats" on the Internet. Chat groups are moderated; some of them however are unmoderated for public discussions. Further, most chat servers allow the creation of "private" chat rooms where participants can "meet" for private discussions. "Chat" is a graphical form of an Internet service called IRC, or Internet Relay Chat. IRC was a replacement for a UNIX command called "talk." . Chat clients, on the other hand, are available for all platforms and are graphical in nature, opening up their utility to the majority of Internet users.

(xiii) Intranet : It is a type of information system that facilitates communication within the organisation, among widely dispersed departments, divisions and regional locations. Intranets connect people together with Internet technology, using web browsers, web servers and data warehouses in a single view. With an Intranet, access to all

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information, applications and data can be made available through the same browser. The objective is to organise each individual's desktop with minimal cost, time and effort to be more productive, cost efficient, timely and competitive.

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

(xiv) Electronic Cheque : An electronic cheque has all the same features as a paper cheque. It functions as a message to the sender's bank to transfer funds, and, like a paper cheque, the message is given initially to the receiver who, in turn, endorses the cheque and presents it to the bank to obtain funds. The electronic cheque modeled on the traditional paper cheque, and uses a digital signature for signing and endorsing. Electronic cheque can be delivered either by direct transmission over a network, or by electronic mail. In either case, existing banking channels can clear payments over their networks. This leads to a convenient integration of the existing banking infrastructure and the Internet.

Electronic Purses: Electronic purse is very similar to a pre-paid card. While making purchases, customers pass their cards through a vendor's point of sale terminal. No credit check or signature is needed. Validation is done through a Personal Identification Number (PIN). Once the transaction is complete, funds are deducted directly from the cards and transferred to the vendor's terminal.

4. (a) **General Characteristics of 1st and 2nd Generation of Computers are discussed below.**

General characteristics of 1st generation computers

- (i) These computers uses vacuum tube for data processing and storage.
- (ii) They had a memory size of 20 bytes and speed of 5 mbps.
- (iii) They produced a lot of heat.
- (iv) These computers were unreliable and could not work fast with a lots of data.
- (v) They were using punch card for data storage.
- (vi) The programmers were machine dependent.
- (vii) These computers consumed a lot of power.

General characteristics of 2nd generation computers

- (i) They were capable of translating, process and store data.
- (ii) They were much smaller in size than first generation computers.
- (iii) They had got memory size of 32 bytes and speed of 10 mbps.
- (iv) They were reliable compared to first generation computers.
- (v) They produced less heat compared to first generation computers.
- (vi) They use punch card for data storage.
- (vii) They consumed less energy compared to first generation computers.
- (viii) They were less expensive to produce.

(b) On the basis of working principals of computers, they can be categorized into Analog, Digital and Hybrid computers. These are briefly discussed below.

- (i) **Analog Computer** : An analog computer is a form of computer that uses continuous physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved. It is different from the digital computer in that it can perform numerous mathematical operations simultaneously. It is also unique in terms of operation, as it utilizes continuous variables for the purpose of mathematical computation.
- (ii) **Digital Computer** :A computer that performs calculations and logical operations with quantities represented as digits, usually in the binary number system. A digital computer is designed to process data in numerical form; its circuits perform directly the mathematical operations of addition, subtraction, multiplication, and division. The numbers operated on by a digital computer are expressed in the binary system; binary digits, or bits, i.e. 0 and 1, so that 0, 1, 10, 11, 100, 101, etc., correspond to 0, 1, 2, 3, 4, 5, etc. Binary digits are easily expressed in the computer circuitry by the presence (1) or absence (0) of a current or voltage. A digital computer can store the results of its calculations for later use, can compare results with other data, and on the basis of such comparisons can change the series of operations it performs. Digital computers are used for reservations systems, scientific investigation, data-processing and word-processing applications, desktop publishing, electronic games, and many other purposes.
- (iii) **Hybrid Computer (Analog + Digital)** :A combination of computers those are capable of inputting and outputting in both digital and analog signals. Hybrid computer is a digital computer that accepts analog signals, converts them to digital and processes them in digital form. This integration is obtained by digital to analog and analog to digital converter. A hybrid computer may use or produce analog data or digital data. It accepts a continuously varying input, which is then converted into a set of discrete values for digital processing. A hybrid computer system setup offers a cost-effective method of performing

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complex simulations. A hybrid computer is capable of real-time solution has been less expensive than any equivalent digital computer. Hybrid Machines are generally used in scientific applications or in controlling industrial processes.

5. (a) The data is stored in Floppy Disk in the manner discussed below.

When the new diskettes (or a new hard drive) are purchased, the disks inside are nothing more than simple, coated disks encased in plastic. The disk provides magnetically mapping of the disk space so that the computer can go directly to a specific point on the diskette without searching through data. The process of mapping a diskette is called formatting or initializing. To store the data, formatting a disk is required to create a set of magnetic concentric circles called tracks. The number of tracks on a disk varies with the type (most high-density diskettes have 80). The tracks on a disk do not form a continuous spiral like those on a phonograph record - each one is a separate circle. Most tracks are numbered from the outermost circle to the innermost, starting from zero. Each track on a disk is also split into smaller parts resulting in short segments, or sectors. All the sectors on the disk are numbered in one long sequence, so the computer can access each small area on the disk with a unique number. A sector is the smallest unit with which any disk drive (diskette drive or hard drive) can work. Each bit and byte within a sector can have different values, but the drive can read or write only whole sector at a time. If the computer needs to change just one byte out of 512, it must rewrite the entire sector.

(b) The advantages of Direct access storage are:

- (i) Magnetic rigid disk is a direct access storage medium; therefore, individual records can be retrieved without searching through the entire file.
- (ii) The costs of disks are steadily declining.
- (iii) For real-time systems where direct access is required, disks are currently the only practical means of file storage. Other new types of storage, such as bubble storage, are not widely used yet.
- (iv) Records can be readily updated by writing the new information over the area where the old information was stored.
- (v) With removable disk packs, a single disk drive can store large quantities of data although all but one of the disks is offline at any given point in time. However, being offline is not a disadvantage for many applications, especially batch applications.
- (vi) Interrelated files stored on magnetic disk can allow a single transaction to be processed against all of these files simultaneously.
- (vii) Data corruption rate is much less than other storage media like floppy disk, magnetic tapes.

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The disadvantages of Direct access storage are:

- (i) Security of information stored on magnetic disks which are used as shared, is major concern.
- (ii) Regular 'head' crashes can damage the surface of the disk, leading to loss of data in that sector.
- (iii) The disk is fixed inside the computer and cannot easily be transferred to another computer.
- (iv) Updating a master file stored on disk destroys the old information. Therefore, disk does not provide an automatic audit trail. When disk is used, back-up and audit trail require that each old master file records be copied to another medium prior to update.

6. (a) In the early 1990s, Xerox saw media reports commenting that the functioning of the company's HR department was 'hardly a model of efficiency.' The company realized that the fully centralized functions of hiring, awarding bonuses and granting promotions were resulting in the central HR department being over-burdened. More often than not, HR personnel were tied up in paperwork that left them little time to use their skills elsewhere. As a result, tasks such as counseling managers on ways to handle employee problems were frequently postponed by HR managers.

In the existing setup, hiring managers filled in job description forms and sent them to the HR department, where the information was reentered on posting forms. It often took a week before employees could view the job listings, thus delaying the recruitment process considerably.

After initial thought, Xerox began to explore the possibilities of using a computer system to release HR professionals from the monotony of administrative tasks. The company decided to install an Intranet application to act as a communication and productivity tool for its managers and employees. The idea was to deliver traditional human resource information such as benefits, compensation, policy manuals, phone directory and training as well as the ability to change personal information like name and address, to minimize the HR administrative support needed by employees.

- (b) To overcome the problem of existing system, it was thus decided to develop the required HRMS in-house. This marked the beginning of the Xerox PeopleNet initiative.

Xerox began with an internal HR survey to identify the desired objectives of the proposed system. The company's existing infrastructure comprised workstations and the basic networking hardware under a mainframe environment which was not user-friendly enough for the typical manager/employee skill set.

The Xerox Ltd shifted from the existing hardware setup to a personal computer (PC) setup. Therefore, client/server architecture was decided upon as the best choice. Prototyping was used to test different development approaches and design the overall graphical user interface (GUI). The infrastructure support was outsourced

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from a leading IT services company and all the software developed was put through strict compatibility testing to ensure that it complied well with other Xerox applications and standard configurations.

Xerox opted for a phased launch because it was shifting from mainframes to a PC based setup and the developers needed to understand the new infrastructure well before going in for a full-fledged implementation. The project followed a phased development approach of prototyping, testing, re-testing and then rolling out on a continual basis.

As the hardware setup stabilized and more features were added, Xerox PeopleNet became increasingly popular within the organization.

- (c) Xerox PeopleNet supported applications covering such areas as training, retirement fund performance and a corporate phone directory. In addition, employees could check Xerox's stock price as well as those of its competitors. The unique feature of Xerox PeopleNet was that unlike typical HRMSs, it did not restrict the availability of information to HR staff alone. All employees could access information through any PC on the company's network. The solution helped Xerox accomplish its objectives of empowering its people, increasing satisfaction and boosting productivity.

In addition, online publication of the human resources manual and other publications saved approximately millions of dollar annually in printing costs.

Online transaction processing and electronic signature approval capabilities added later saved another millions of dollar annually by eliminating manual forms and paper-based processing.

On the hiring front, managers could open the Xerox PeopleNet application on the desktop, create a posting on an online form and post it immediately on a central electronic bulletin board.

Any interested Xerox employee could then print an application form and submit it to the hiring manager in paper form. The paper element was to be completely eliminated over a period of time and internal job applications were to be processed entirely online.

The system included a feedback feature that let employees suggest new ideas and improvements. As a result, employees were able to monitor their profit sharing and retirement plans and change their contributions from their desktops itself.

- 7. (a) **Image Processing:** Image Processing captures an electronic image of data so that it can be stored and shared. Imaging systems can capture almost anything, including key stroked or handwritten documents (such as invoices or tax returns), flowcharts, drawings, and photographs. The steps to document imaging are discussed below.
 - (i) **Step 1: Data capture.** The most common means of converting paper documents into electronic images is to scan them. The scanning device converts the text and pictures into digitized electronic code. The scanner can

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range from a simple hand held device to a high-end, high-speed scanner capable of scanning more than 2,500 pages an hour.

- (ii) **Step 2: Indexing.** Document images must be stored in a manner that facilitates their retrieval. Therefore, important document information, such as purchase order numbers or vendor numbers, is stored in an index.
- (iii) **Step 3: Storage.** Because images require a large amount of storage space, they are usually stored on an optical disk. One 5.25-inch optical platter can store 1.4 gigabytes, or about 25,000 documents.
- (iv) **Step 4: Retrieval.** Keying in any information stored in an index can retrieve documents. The index tells the system which optical disk to search and the requested information can be quickly retrieved.
- (v) **Step 5: Output.** An exact replica of the original document is easily produced on the computer's monitor or on paper, or is transmitted electronically to another computer.

Advantages of Image Processing are as follows:

- (i) **Accessibility:** Documents can be accessed and reviewed simultaneously by many people, even from remote locations.
 - (ii) **Accuracy:** Accuracy is much higher because costly and error-prone manual data-entry processes are eliminated.
 - (iii) **Availability:** There are no more lost or misfiled documents.
 - (iv) **Capacity:** Vast amounts of data can be stored in very little space, which significantly reduces storage and office space.
 - (v) **Cost:** When large volumes of data are stored and processed, the cost per document is quite inexpensive. As a result, the costs to input, file, retrieve, and refile documents are reduced significantly.
 - (vi) **Customer satisfaction:** When waiting time is significantly reduced (due to lost or misfiled documents, queue time, etc.), customers can get the information almost immediately.
 - (vii) **Security:** Various levels of passwords (network, data base, files, etc.) and clearances can be assigned to restrict document access.
 - (viii) **Speed:** Data can be retrieved at fantastic speeds. Stored documents can be indexed using any number of identifying labels, attributes, or keywords.
 - (ix) **Versatility:** Handwritten or types text can be added to an image, as can voice messages. Documents can be added to word processing files; the data can be included in a spreadsheet or data base.
8. (a) A monitor is also called as video display terminal (VDT). The visual display of the processed data, which the users can view, is got through the monitor. Computer monitors come in a variety of screen sizes. There are two types of computer

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monitors available, namely CRT and Flat panel. CRT stands for *cathode ray tube*, describing the technology inside an analog computer monitor or television set. The CRT monitor creates a picture out of many rows or lines of tiny colored dots. These are technically not the same thing as pixels, but the terms are often used interchangeably. The more lines of dots per inch, the higher and clearer the resolution. Therefore 1024 x 768 resolutions will be sharper than 800 x 600 resolutions because the former uses more lines creating a denser, more detailed picture. Higher resolutions are important for displaying the subtle detail of graphics.

Advantages of CRT, LCD and Plasma display devices:

<i>CRT</i>	<i>LCD</i>	<i>Plasma</i>
1. It has high dynamic range of colors, wide gamut and low black level.	1. Very compact and light weighted.	1. Compact and light weighted.
2. It can display natively in almost any resolution and refresh rate.	2. Low power consumption.	2. High contrast ratios, excellent color, wide gamut and low black level.
3. It has low response time generally in sub-milliseconds.	3. No geometric distortion.	3. High speed response time.
4. It has zero color, saturation, contrast or brightness distortion as well as excellent viewing angle.	4. Little or no flicker depending on backlight technology.	4. Near zero color, saturation, contrast or brightness distortion as well as excellent viewing angle.
5. Usually much cheaper than LCD or Plasma screens.		5. No geometric distortion.
		6. Highly scalable, with less weight gain per increase in size (from less than 30 inches (760 mm) wide to the world's largest at 150 inches (3,800 mm)).

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Limitations of CRT, LCD and Plasma display devices:

<i>CRT</i>	<i>LCD</i>	<i>Plasma</i>
1. Large size and weight, especially for bigger screens (a 20-inch unit weighs about 20 to 30 Kg).	1. Limited viewing angle, causing color, saturation, contrast and brightness to vary, even within the intended viewing angle, by variations in posture.	1. Large pixel pitch, meaning either low resolution or a large screen.
2. High power consumption.	2. Uneven backlighting in some monitors, causing brightness distortion, especially toward the edges.	2. Noticeable flicker when viewed at close range.
3. Geometric distortion caused by variable beam travel distances.	3. Slow response times, which cause smearing and ghosting artifacts.	3. High operating temperature and power consumption.
4. Older CRTs are prone to screen burn-in.	4. Only one native resolution. Displaying resolutions either requires a video scalar, lowering perceptual quality, or display at 1:1 pixel mapping, in which images will be physically too large or won't fill the whole screen.	4. Only has one native resolution. Displaying other resolutions requires a video scalar, which degrades image quality at lower resolutions.
5. Produces noticeable flicker at low refresh rates.	5. Fixed bit depth and incapable of producing true color by many cheaper LCDs.	5. Fixed bit depth and incapable of producing true color by many cheaper Plasma.
	6. In a constant on situation, thermalization may occur, which is when only part of the screen has overheated and therefore looks discolored compared to the rest of the screen.	6. Dead pixels are possible during manufacturing.

(b) Factors determining purchase of good quality printer are discussed below.

- (i) One of the main considerations when looking for good quality is the amount of usage one can anticipate with the device. An inkjet printer works very well for

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relatively low demands that are primarily text documents. Also, usage that may require some type of color on an occasional basis can be handled very well with an inkjet printer. However, inkjets are not designed for a large amount of production each day. Also, the cost of new ink cartridges can be prohibitive when the volume of printing is higher. Ink cartridges for inkjet types of printers simply do not last that long.

- (ii) For environments where there will be a high volume of daily usage, there is no doubt that the laser printer is the better option. The laser printer is built to hold up to repeated daily usage and large print jobs. Also, the ink cartridges that are manufactured for the laser type of printer will produce quite a few more pages than the ones created for inkjets. Color is also a factor when it comes to the laser printer. Laser printers simply produce a higher quality of color graphic or image, which make it ideal when the print job involves the printing of sales brochures or a mass mail out to customers. When deciding on whether to purchase an inkjet or a laser printer, volume usage will be a key factor.
- (iii) Another important consideration when choosing between an inkjet and a laser printer is the initial cost. Good quality inkjets can be purchased for a relatively low amount of money. If the budget is tight, going with an inkjet, at least until cash flow improves, may be a wise move. Keep in mind that while the initial purchase is low, replacing the ink cartridges can become cost prohibitive if our average print usage continues to increase over time.
- (iv) Lastly, the type of paper that will be used is also important when deciding whether to purchase an inkjet or a laser printer. A laser printer usually can accommodate various weights of paper with little or no problem. Inkjets tend to work best with standard twenty-weight paper. If the idea is to use the printer to create sales and marketing material, small posters for trade shows, and other print jobs that require a stiffer paper product, then the laser printer is definitely the best option.

A good rule of thumb when it comes to choosing between an inkjet or a laser printer is to remember usage, paper type, and amount of color. If all three of these factors are highly important, then the laser printer is the best choice. On considering of price, low usage, little color and use of only standard paper, the inkjet printer will work very well.

9. (a) The Operating System may be defined as an integrated system of programs which supervises the operation of the CPU, controls the input/output functions of the computer system, translates the programming languages into the machine languages and provides various support services. It act as an interface between hardware and user.

There are six basic functions that an operating system can perform. These are:-

- (i) **Schedule Jobs:** Operating systems can determine the sequence in which jobs are executed, using priorities established by the organization.

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- (ii) **Manage Hardware and Software Resources:** Operating systems 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 authorized 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:** Operating systems 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.
- (b) **Flavours of Windows Operating System are discussed below.**

Microsoft Windows Operating Systems were developed for the home user and the other has been for the professional IT user. The dual routes have generally led to home versions having greater multimedia support and less functionality in networking and security, and professional versions having inferior multimedia support and better networking and security.

Windows 95: Windows 95, a 32 bit OS was released in August 1995. The significance of a 32-bit OS as opposed to a 16-bit OS can be measured by the amount of internal main memory that can be directly access by the user/program. For example, with a 16-bit version of MS-DOS, the maximum amount of directly accessible memory is 1 MB. However, with a 32 bit OS, the user has direct access to 4 GB of main memory. Windows 95 was designed to have certain critical features over and above what was already supplied by Windows 3.1 or Windows for Workgroups. These included:

- (i) A 32-bit architecture which provides for a multitasking environment allowing the user to run multiple programs or execute multiple tasks concurrently. This architecture also enables faster data / file access as well as an improvement in printing delivery.
- (ii) A friendlier interface fitted with what is described as 'one click' access. One click access refers to the fact that users didn't have to double click on the mouse every time that they wanted to activate an application. Other congenial attributes include the ability to employ long file names, easy navigation routes

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and 'plug and play technology' enabling users to connect various peripheral devices or add-ons with the minimum of fuss.

- (iii) Windows 95 is also network ready. In other words the OS is designed for easy access to network resources. The OS also facilitates gateways to e-mail and fax facilities and access to the Internet via the Microsoft Network. In addition Windows 95 is backwardly compatible with most 3.1 Windows / DOS applications so enabling users to migrate from previous systems / applications.

Windows NT: Unlike Windows 3.0 and Windows 95, Windows New Technology (NT) is what is known as an industry standard mission critical OS. As a 32 bit OS Windows NT represents the preferred platform for Intel's more powerful Pentium range of processors. Critical features that allow the program to context the commercial OS market include:

- A stable multitasking environment,
- Enhanced security features,
- Increased memory,
- Network utilities,
- Portability: NT can operate on microprocessors other than those designed for the PC.

Windows NT is, as might be expected, more expensive than the other Windows OS and makes greater processing demands.

Windows 2000 : A operating systems produced by Microsoft for use on personal computers, business desktops, laptops, and servers. It was the successor to Windows NT 4.0, and is the final release of Microsoft Windows to display the "Windows NT" designation. It was succeeded by Windows XP for desktop systems in October 2001 and Windows Server 2003 for servers in April 2003. Windows Me was designed for home use, while Windows 2000 was designed for business use.

Windows XP : It is an operating system produced by Microsoft for use on personal computers, including home and business desktops, laptops, and media centers. The name "XP" is short for "eXPerience." Microsoft released Windows XP, a version built on the Windows NT kernel that also retained the consumer-oriented usability of Windows 95 and its successors. This new version came in two distinct editions: Home and Professional. The former lacking many of the superior security and networking features of the professional edition.

Windows XP has new features to the Windows line, including:

- (i) Faster start-up,
- (ii) More user-friendly interface, including the framework for developing themes for the desktop environment,

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- (iii) Fast user switching, which allows a user to save the current state and open applications of their desktop and allow another user to log on without losing that information,
- (iv) The Clear Type font rendering mechanism, which is designed to improve text readability on liquid crystal display (LCD) and similar monitors,
- (v) Remote Desktop functionality, which allows users to connect to a computer running Windows XP Pro from across a network or the Internet and access their applications, files, printers, and devices,
- (vi) Support for most DSL modems and IEEE 802.11 connections, as well as networking over FireWire, and Bluetooth.

Windows Vista: In 2007 Microsoft released Windows Vista. It contains a number of new features, from a redesigned shell and user interface to significant technical changes, with a particular focus on security features. Windows Vista contains many changes and new features, including an updated graphical user interface and visual style dubbed Aero, a redesigned search function, multimedia tools including Windows DVD Maker, and redesigned networking, audio, print, and display sub-systems. Vista aims to increase the level of communication between machines on a home network, using peer-to-peer technology to simplify sharing files and media between computers and devices. Windows Vista includes version 3.0 of the .NET Framework, allowing software developers to write applications without traditional Windows APIs.

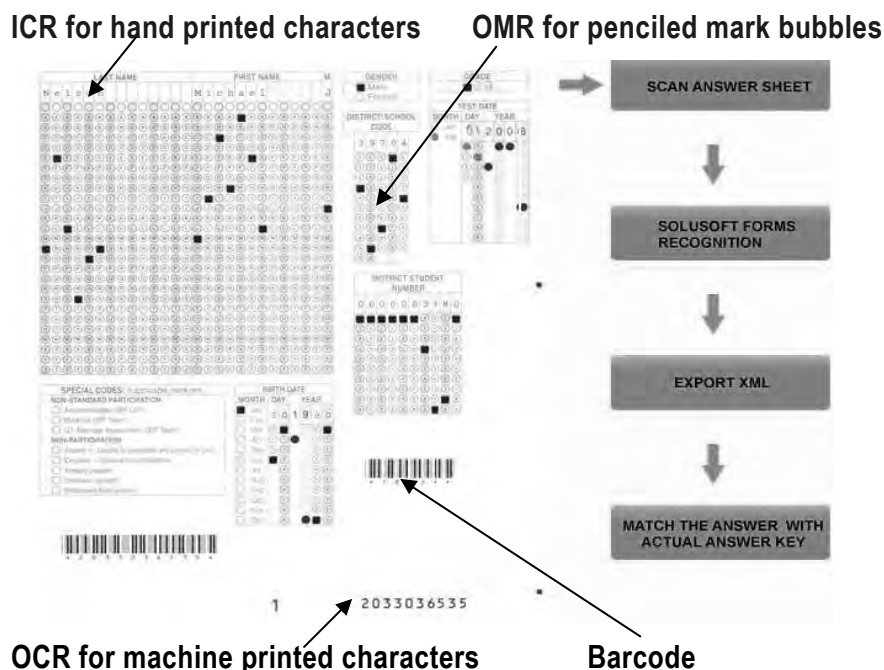
Windows 7.0 : It is the latest release of Microsoft Windows, a series of operating systems produced by Microsoft for use on personal computers, including home and business desktops, laptops, notebook, tablet PCs, and media center PCs. Windows 7 was released for general retail availability in October , 2009.

Unlike its predecessor, Windows Vista, which introduced a large number of new features, Windows 7.0 was intended to be a more focused, incremental upgrade to the Windows line, with the goal of being compatible with applications and hardware which Windows Vista wasn't at the time. Presentations given by Microsoft in 2008 focused on multi-touch support, a redesigned Windows shell with a new taskbar, referred to as the Superbar, a home networking system called HomeGroup, and performance improvements. Some standard applications that have been included with prior releases of Microsoft Windows, including Windows Calendar, Windows Mail, Windows Movie Maker, and Windows Photo Gallery, are not included in Windows 7.0; most are instead offered separately at no charge as part of the Windows Live Essentials suite.

10. (a) The key challenges faced in the scoring process are discussed below:
- (i) To process vast number of answer sheets.

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- (ii) To provide results in timely manner to meet Department of Education (DOE) deadlines.
 - (iii) To assure 99.9% accuracy of all student results.
 - (iv) To provide highly automated processing with minimum human intervention.
 - (v) To provide scalable solution to meet peak processing.
 - (vi) To get cost effective solution.
- (b) The customer has implemented automated scoring solution based on Forms Processing application to recognize machine printer character using Optical Character Recognition (OCR), penciled bubbles using Optical Mark Recognition (OMR), handwriting using Intelligent Character Recognition (ICR) & Barcode technologies of the student test booklet. Students' booklets are cut into sheets and scanned by high speed scanning systems that use Kodak 840 scanners to create JPEG image files. These image files are then processed by Forms Recognition Processor that is calibrated to recognize various booklet types and the contents of each booklet type including bubble, bar-coded, and machine printed areas. The complete process is depicted in the following diagram:



11. (a) Decision Support System (DSS) is a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision maker to compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions. A DSS may present information graphically and may include an expert

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system or artificial intelligence. DSS have also achieved broad use in accounting and auditing today.

The common characteristics of Decision Support Systems are as mentioned below:

- (i) **DSS support management decision making** – These enhance decision quality. While the system might not point to a particular decision, it is the user who ultimately makes the final choice.
 - (ii) **DSS solve relatively unstructured problems** – The unstructured problems with lesser well-defined questions do not have easy solution procedures and therefore need some managerial judgment. Such problems can be handled and addressed with the help of appropriate DSS.
 - (iii) **DSS are friendly computer interface** – A friendly computer interface is also a characteristic of a DSS. As the managers and other decision makers using DSS are not necessarily good programmers, such systems must be easy to use. The communication between the user and the DSS is made easy through nonprocedural modeling languages.
 - (iv) **DSS should be able to respond quickly to the changing needs of the decision makers** – As managers must plan for future activities, they rely heavily on assumptions. Any DSS should address the decision making for a variety of assumptions. A key characteristic of many systems is that these allow users to ask what-if questions and examine the results of these questions.
- (b) **Components of a DSS:** A decision support system has four basic components: (i) The users, (ii) Database, (iii) Planning language, and (iv) Model base.
- (i) **The users:** The user of a Decision Support System (DSS) is usually a manager with an unstructured or semi-structured problem to solve. In fact, user does not require a computer background to use a DSS for problem solving. He must have thorough understanding of the problem and the factors to be considered in finding a solution.
 - (ii) **Database:** DSS includes one or more databases. These databases contain both routine and non-routine data from both internal and external sources. The data from external sources include data about economic condition, market demand for goods and services and industry competition, whereas internal data includes data from the financial and managerial accounting system, marketing, production and personnel department.
 - (iii) **Planning language:** Two types of planning languages are commonly used in DSS.
 - **General Purpose:** These languages allow user to perform many routine tasks viz., retrieving various data from a database or performing statistical analysis, budgeting, forecasting and worksheet oriented

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problem. The languages used in most of the spread sheets are the good examples.

- **Special purpose:** Special purpose planning languages are statistical languages viz., SAS, SPSS and Mini Tab. These languages perform statistical and mathematical operations.

- (iv) **Model Base:** The model base is the brain of the decision support system because it performs data manipulation and computations with the data provided to it by the user and database. Model base is custom developed model that does some types of mathematical functions viz., cross-tabulation, regression analysis, time series analysis, linear programming and financial computation. The analysis provided by the routines in the model base is the key to supporting the user's decision.

12. (a) A data base is a computer file system that uses a particular file organization to facilitate rapid updating of individual records, simultaneous updating of related records, easy access to all records, by all applications programs, and rapid access to all stored data which must be brought together for a particular routine report or inquiry or a special purpose report or inquiry.

A database management 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, then, 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. which are used for storing and retrieving the data in a fast and efficient manner. The hardware consists of the secondary storage volumes, disks, drums, etc. on which the database resides, together with the associated devices, control units, channels, and so forth.

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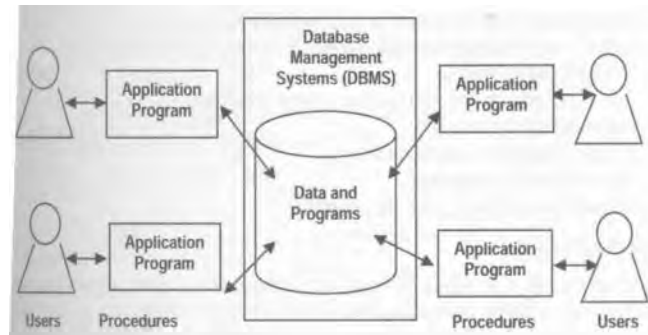


Figure shows Simplified Picture of a Database Management system

(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. For performing operations such as insertion, deletion and updation, query languages like SQL or application software like Visual Basic can be used.

(iv) **Users:** The broad classes of users are:

- **Application Programmers and System Analysts:** System analysts determine the requirements of end users; especially naive and parametric end users, and develop specifications for canned transactions that meet these requirements. Application programmers implement these specifications as programs, and then they test, debug, document, and maintain these canned transactions.
- **End Users:** These are the people who require access to the database for querying, updating and generating reports. The database exists primarily for their use.
- **Database Administrator (DBA):** DBA is responsible for authorization access to the database, for coordinating and monitoring its use, and for acquiring the needed software and hardware resources.
- **Database Designers:** These are responsible for identifying the data to be stored in the database for choosing appropriate structures to represent and store this data.

(b) Benefits of using DBMS are:

- (i) Reduced data redundancy and inconsistency,
- (ii) Enhanced data integrity and security,
- (iii) Provide logical and physical data independence,
- (iv) Provide application data independence,
- (v) Reduced complexity of the organization's Information System environment,

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- (vi) Provide faster data accessibility and improved data sharing,
 - (vii) Increased productivity of application development,
 - (viii) Low cost of developing and maintaining system.
- 13. (a)** The database administrator is a database professional who actually creates and maintains the database, and carries out the policies developed by the data administrator. The role includes the development and design of database strategies, monitoring and improving database performance and capacity, and planning for future expansion requirements. They may also plan, co-ordinate and implement security measures to safeguard the database. The various functions performed by DBA are:
- (i) DBA has the overall authority to establish and control data definitions and standards and also responsible for determining the relationships among data elements, and for designing the data base security system to guard against unauthorised use.
 - (ii) DBA also trains and assists applications programmers in the use of data base. A data dictionary is developed and used in a data base to document and maintain the data definitions.
 - (iii) To design the database, the data base administrator must have a discussion with users to determine their data requirement and then decides the schedule and accuracy requirements, the way and frequency of data access, search strategies, physical storage requirements of data, level of security needed and the response time requirements.
 - (iv) DBA may also identify the source of data and the person responsible for originating and updating of data. The database administrator then converts these requirements into a physical design that specifies hardware resources required for the purpose.
 - (v) Defining the contents of the data base is an important part of data base creation and maintenance. The process of describing formats, relationships among various data elements and their usage is called data definition and the DBA uses data definition language (DDL) for this purpose.
 - (vi) Maintaining standards and controlling access to data base are two other important functions that are handled by the DBA using DDL. The DBA specifies various rules which must be adhered to while describing data for a database. The DBA uses access controls to allow only specified users to access certain paths into the data base and thus prevent unauthorized access.

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- (vii) The DBA also prepares documentation which includes recording the procedures, standard guidelines and data descriptions necessary for the efficient and continued use of the data base environment.
 - (viii) It is also a duty of the DBA to ensure that the operating staff performs its database processing related responsibilities which include loading the database, following maintenance and security procedures, taking backups, scheduling the database for use and following restart and recovery procedures after some hardware or software failure, in a proper way.
 - (ix) The DBA also monitors the data base environments. They ensure that the standards for database performance are being met and the accuracy, integrity and security of data is being maintained.
 - (x) DBA also setup procedures for identifying and correcting violation of standards, documents and corrects errors. This is accomplished by carrying out a periodic audit of the database environment.
 - (xi) Finally, The DBA is responsible for incorporating any enhancements into the database environment which may include new utility programs or new systems releases, and changes into internal procedures for using data base etc.
- (b) A query language is a set of commands to create, update and access data from a database allowing users to raise adhoc queries / questions interactively without the help of programmers. Structured Query Language (SQL) is a computer programming language used to manipulate information in relational database management systems (RDBMS).). SQL is both the American National Standards Institute(ANSI) and International Organization for Standardization(ISO) standard for accessing data in RDBMS. While Structured Query Language is arguably easier to use than traditional computer programming languages, it is also considered to be a very powerful and often complex technology.

The SQL language is usually considered to have three parts: DML or Data Manipulation Language, DDL or Data Definition Language, and DCL or Data Control Language. DML consist of SELECT, UPDATE, INSERT, and DELETE statements. DDL is made up of CREATE and ALTER statements. And DCL is comprised of GRANT and REVOKE statements. In recent years DML, has been expanded to include the MERGE statement and DDL has had the APPEND statement added.

The SQL language is sub-divided into several language elements, including:

- (i) *Clauses*, which are in some cases optional, constituent components of statements and queries.
- (ii) *Expressions* which can produce either scalar values or tables consisting of columns and rows of data.

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- (iii) *Predicates* which specify conditions that can be evaluated to Boolean (true/false/unknown) truth values and which are used to limit the effects of statements and queries, or to change program flow.
- (iv) *Queries* which retrieve data based on specific criteria.
- (v) *Statements* which may have a persistent effect on schemas and data, or which may control transactions, program flow, connections, sessions, or diagnostics.
- (vi) SQL statements also include the semicolon (";") statement terminator.
- (vii) *Insignificant whitespace* is generally ignored in SQL statements and queries, making it easier to format SQL code for readability.

14. Godrej Consumer Products Limited (GCPL) decided to implement an ERP System which would ensure that the data was generated in a consistent and structured format which could be easily archived. However, a lot of ERP data in standardized format was lying idle unless required for an ERP query or statistic. Hence, the company thought it to be imperative to use it to the company's benefit.

Data warehousing tools are mostly used for analysis and trends that allow the company to create short- and long-term strategies and business problem solutions. The company can load data like sales figures of goods from the factory to the distributors (primary sales), from distributors to retailers (secondary sales), and from retailers to end-users into a common database in the warehouse. The data warehouse can now allow deriving sales and inventory trends. Suppose primary sales have increased over a period of time and secondary sales have decreased. This can lead to 'dumping' or excess inventory. The trend analysis can thus help avoid a situation like this and maintain a consistent flow of inventory.

15. (a) Transmission protocols are sets of rules or conventions that must be adhered to by both the communicating parties to ensure that the information being exchanged between them is received and interpreted correctly. A protocol defines the following three aspects of digital communication.
- (i) *Syntax* – The format of data being exchanged, character set used, type of error correction used, type of encoding scheme being used.
 - (ii) *Semantics* – Type and order of messages used to ensure reliable and error-free information transfer.
 - (iii) *Timing* – Define data rate selection and correct timing for various events during data transfer.

Communication protocols are defined in layers, the first of which is the physical layer or the manner in which nodes in a network are connected to one another. Both the network software and network-interface card have to adhere to a network

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protocol. The RS-232 C connector is the standard for some communication protocols. Subsequent layers, the number of which vary between protocols, describe how messages are packaged for transmission, how messages are routed through network, security procedures and the manner in which messages are displayed.

A number of different protocol codes are in use. For example, X.12 is the standard for electronic data interchange (EDI). X.75 is used for interconnection between networks of different countries, and XMODEM is used for uploading and downloading files. The set of most common protocols used on the Internet is called TCP/IP.

- (b) **OSI Model:** ISO (International Organization for Standardization) has facilitated communication of heterogeneous hardware or software platforms with each other with the help of OSI model consisting of following seven layers of functions with their associated controls. Each of the seven layers uses different protocols.
- (i) Layer 1 or **Physical Layer** is a hardware layer which specifies mechanical features as well as electromagnetic features of the connection between the devices and the transmission. Network topology is a part of this layer.
 - (ii) Layer 2 or **Data Link Layer** is also a hardware layer which specifies channel access control method and ensures reliable transfer of data through the transmission medium.
 - (iii) Layer 3 or **Network Layer** makes a choice of the physical route of transmission of say, a message packet; also creates a virtual circuit for upper layers to make them independent of data transmission and switching. It also establishes, maintains, terminates connections between the nodes, and ensures proper routing of data.
 - (iv) Layer 4 or **Transport Layer** ensures reliable 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.
 - (v) Layer 5 or **Session Layer** establishes, maintains and terminates sessions (dialogues) between user processes. Identification and authentication are undertaken at this layer level.
 - (vi) Layer 6 or **Presentation Layer** controls on-screen display of data and transforms data to a standard application interface. Encryption, data compression can also be undertaken at this layer level.

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- (vii) Layer 7 or **Application Layer** provides user services such as file transfer, file sharing, etc. Database concurrency and deadlock situation controls are undertaken at this layer level.

16. There are five main phases in Business Continuity Planning life cycle which are discussed below.

PHASE I – ANALYSIS: The analysis phase in the development of a BCP manual consists of an impact analysis, threat analysis, and impact scenarios with the resulting BCP plan requirement documentation.

- (i) **Impact analysis (Business Impact Analysis, BIA):** An impact analysis results in the differentiation between critical (urgent) and non-critical (non-urgent) organization functions/ activities. A function may be considered critical if the implications for stakeholders of damage to the organization resulting are regarded as unacceptable. Perceptions of the acceptability of disruption may be modified by the cost of establishing and maintaining appropriate business or technical recovery solutions. A function may also be considered critical if dictated by law. The impact analysis results in the recovery requirements for each critical function.
- (ii) **Threat analysis:** Documenting potential threats is recommended to detail a specific disaster's unique recovery steps. Some common threats include disease, earthquake, fire , flood, Cyber attack , bribery, hurricane , utility outage, terrorism. All threats in the examples above share a common impact: the potential of damage to organizational infrastructure - except one (disease).
- (iii) **Definition of impact scenarios :** After defining potential threats, documenting the impact scenarios that form the basis of the business recovery plan is recommended. In general, planning for the most wide-reaching disaster or disturbance is preferable to planning for a smaller scale problem, as almost all smaller scale problems are partial elements of larger disasters.
- (iv) **Recovery requirement documentation:** After the completion of the analysis phase, the business and technical plan requirements are documented in order to commence the implementation phase. A good asset management program can be of great assistance here and allow for quick identification of available and re-allocateable resources.

PHASE II – SOLUTION DESIGN

The goal of the solution design phase is to identify the most cost effective disaster recovery solution that meets two main requirements from the impact analysis stage. The first is the minimum application and application data requirements and the second one is the time frame in which the minimum application and application data must be available for IT applications. The Disaster recovery plans may also be required outside the IT applications domain.

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PHASE III –IMPLEMENTATION

The implementation phase, quite simply, is the execution of the design elements identified in the solution design phase. Work package testing may take place during the implementation of the solution, however; work package testing does not take the place of organizational testing.

PHASE IV –TESTING AND ORGANIZATIONAL ACCEPTANCE

The purpose of testing is to achieve organizational acceptance that the business continuity solution satisfies the organization's recovery requirements. Plans may fail to meet expectations due to insufficient or inaccurate recovery requirements, solution design flaws, or solution implementation errors. Testing may include various aspects which covers crisis command team call-out testing, technical swing test from primary to secondary work locations, technical swing test from secondary to primary work locations, application test and business process test. Problems identified in the initial testing phase may be rolled up into the maintenance phase and retested during the next test cycle.

PHASE V – MAINTENANCE

Maintenance of a BCP manual is broken down into three periodic activities. The first activity is the confirmation of information in the manual; roll out to ALL staff for awareness and specific training for individuals whose roles are identified as critical in response and recovery. The second activity is the testing and verification of technical solutions established for recovery operations. The third activity is the testing and verification of documented organization recovery procedures.

17. (a) The Internet is a network of computers that offers access to information and people. It is an information service that offers e-mail, bulletin boards, and information-retrieval services that can access file directories and databases around the world.

The Intrinsic Benefits of Internet are discussed below.

- (i) Information on business and services are placed in an assembled fashion in a common location.
 - (ii) Access to required information is provided at reasonable costs (which are steadily declining, and with a significant reduction in duplication and distribution costs).
 - (iii) A mechanism for immediate feedback from consumers or business partners is provided.
 - (iv) The cost of information delivery to internal and external sources is reduced.
 - (v) Employee access to significant amount of information is increased.
 - (vi) An efficient means of updating and disseminating current information to customers and internal staff is provided.
 - (vii) Customized information to consumers is delivered (for example, individual investment portfolios can be tracked).
- (b) E-Commerce presents many benefits to individual organizations, consumers, and society as a whole.
- (i) Reduced costs to buyers from increased competition in procurement as more suppliers are able to compete in an electronically open marketplace.

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- (ii) Reduced errors, time, and overhead costs in information processing by eliminating requirements for re-entering data.
- (iii) Reduced costs to suppliers by electronically accessing on-line databases of bid opportunities, on-line abilities to submit bids, and on-line review of rewards.
- (iv) Reduced time to complete business transactions, particularly from delivery to payment.
- (v) Creation of new markets through the ability to easily and cheaply reach potential customers.
- (vi) Easier entry into new markets, especially geographically remote markets, for companies of all sizes and locations.
- (vii) Better quality of goods as specifications are standardized and competition is increased and improved variety of goods through expanded markets and the ability to produce customized goods.
- (viii) Faster time to market as business processes are linked, enabling seamless processing and eliminating time delays.
- (ix) Optimization of resource selection as businesses form cooperative teams to increase the chances of economic successes, and to provide the customer products and capabilities more exactly meeting his or her requirements.
- (x) Reduced inventories and reduction of risk of obsolete inventories as the demand for goods and services is electronically linked through just-in-time inventory and integrated manufacturing techniques.
- (xi) Ability to undertake major global programs in which the cost and personnel needed to manage a non-automated system would be unreasonable or prohibitive.
- (xii) Reduced overhead costs through uniformity, automation, and large-scale integration of management processes.
- (xiii) Reduced use of ecologically damaging materials through electronic coordination of activities and the movement of information rather than physical objects.
- (xiv) Reduced advertising costs.
- (xv) Reduced delivery cost, notably for goods that can also be delivered electronically.
- (xvi) Reduced design and manufacturing cost.
- (xvii) Improved market intelligence and strategic planning.
- (xviii) More opportunity for niche marketing.
- (xix) Equal access to markets (i.e. for small-to-medium enterprises (SMEs) vis-a-vis larger corporations)

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(xx) Access to new markets.

(xxi) Customer involvement in product and service innovation.

18. (a) Supply chain management (SCM) is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption.

According to the Council of Supply Chain Management Professionals (CSCMP), a professional association that developed a definition in 2004, Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies.

The following strategic and competitive areas can be used to their full advantage if a supply chain management system is properly implemented.

- (i) **Fulfillment:** Ensuring the right quantity of parts for production or products for sale arrive at the right time and is enabled through efficient communication, ensuring that orders are placed with the appropriate amount of time available to be filled. The supply chain management system also allows a company to constantly see what is on stock and making sure that the right quantities are ordered to replace stock.
- (ii) **Logistics:** Keeping the cost of transporting materials as low as possible consistent with safe and reliable delivery. Here the supply chain management system enables a company to have constant contact with its distribution team, which could consist of trucks, trains, or any other mode of transportation. The system can allow the company to track where the required materials are at all times. It may be cost effective to share transportation costs with a partner company if shipments are not large enough to fill a whole truck and this again, allows the company to make this decision.
- (iii) **Production:** Ensuring production lines function smoothly because high-quality parts are available when needed. Production can run smoothly as a result of fulfillment and logistics being implemented correctly. If the correct quantity is not ordered and delivered at the requested time, production will be halted, but having an effective supply chain management system in place will ensure that production can always run smoothly without delays due to ordering and transportation.
- (iv) **Revenue & profit:** Ensuring no sales are lost because shelves are empty. Managing the supply chain improves a company's flexibility to respond to unforeseen changes in demand and supply. Because of this, a company has the ability to produce goods at lower prices and distribute them to consumers

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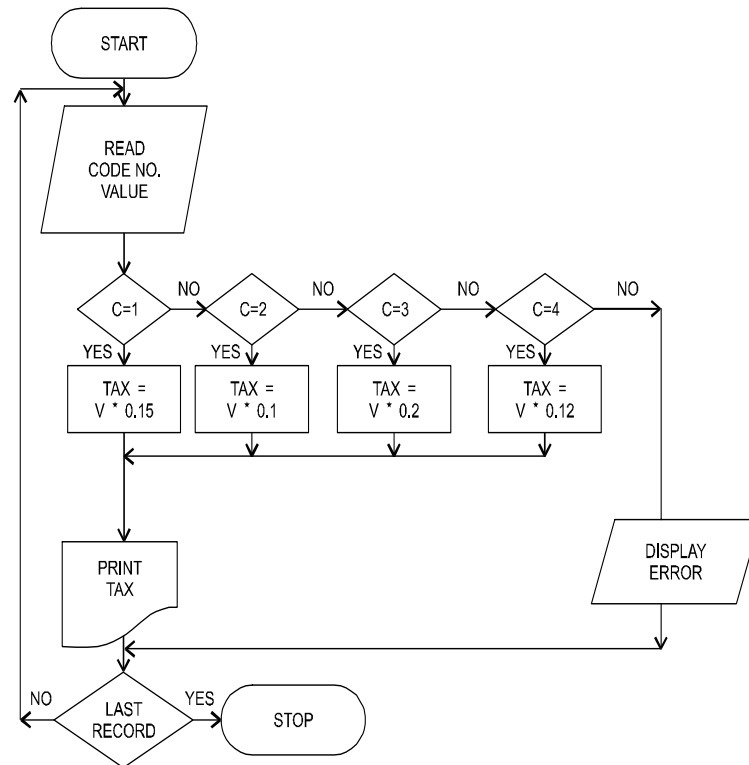
quicker than companies without supply chain management thus increasing the overall profit.

- (v) **Costs:** Keeping the cost of purchased parts and products at acceptable levels. Supply chain management reduces costs by “increasing inventory turnover on the shop floor and in the warehouse”, controlling the quality of goods thus reducing internal and external failure costs and working with suppliers to produce the most cost efficient means of manufacturing a product.
 - (vi) **Cooperation:** Among supply chain partners, SCM ensures 'mutual success'. Collaborative planning, forecasting and replenishment (CPFR) is a longer-term commitment, joint work on quality, and support by the buyer of the supplier's managerial, technological, and capacity development. This relationship allows a company to have access to current, reliable information, obtain lower inventory levels, cut lead times, enhance product quality, improve forecasting accuracy and ultimately improve customer service and overall profits. The suppliers also benefit from the cooperative relationship through increased buyer input from suggestions on improving the quality and costs and through shared savings. Consumers can benefit as well through higher quality goods provided at a lower cost.
- (b) **The Bullwhip Effect:** The Bullwhip Effect or Whiplash Effect is a phenomenon in forecast-driven distribution channels. Because customer demand is rarely perfectly stable, businesses must forecast demand in order to properly position inventory and other resources. Forecasts are based on statistics which are rarely perfectly accurate. Because forecast errors are given, companies often carry an inventory buffer called safety stock. Moving up the supply chain from end-consumer to raw materials supplier, each supply chain participant observes variation in demand and thus greater need for safety stock. In periods of rising demand, down-stream participants will increase their orders. In periods of falling demand, orders will fall or stop in order to reduce inventory. The effect is that variations are amplified the farther one gets from the end-consumer. Bullwhip Effect is a problem in forecast-driven supply chains.

Factors contributing to the Bullwhip Effect are - Forecast Errors, Lead Time Variability, Batch Ordering, Price Fluctuations, Product Promotions, Inflated Orders, Methods intended to reduce uncertainty, variability and lead time, Vendor Managed Inventory (VMI), Just In Time replenishment (JIT) and Strategic partnership (SP).

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19. The required flowchart is drawn below:



20. The required Decision Table is given below:

	RULES							
Conditions:	1	2	3	4	5	6	7	8
1. Order-Value Rs. 20,000	Y	Y	Y	Y	N	N	N	N
2. Trade - Customer	Y	Y	N	N	Y	Y	N	N
3. Year – Ordering Regularly > 5 Years	Y	N	Y	N	Y	N	Y	N
Actions :								
Nil Discount								X
5% "							X	
8% "				X				
10% "						X		
13% "								
15% "			X		X			
18% "		X						
23% "	X							

KEY : Y = YES, N = NO, X = ACTION TO BE TAKEN

SECTION – B: STRATEGIC MANAGEMENT

QUESTIONS

1. State with reasons which of the following statements are correct/incorrect:
 - (a) An opportunity is an inherent capacity which an organization can use to gain strategic advantage over its competitors.
 - (b) The term PESTLE is used to describe a framework for analysis of macro environmental factors.
 - (c) Retrenchment strategy is implemented by redefining the business by adding the scope of business.
 - (d) Changes in strategy may lead to changes in organizational structure.
 - (e) SWOT analysis merely examines external environment of an organization.
 - (f) Cost leadership attempts to gain a competitive advantage.
 - (g) Demarketing is a marketing strategy to destroy the marketing strategy of the competitor.
 - (h) Culture promotes better strategy execution.
 - (i) The Internet can be an economical means of delivering customer services.
2. Write short note on:
 - (a) Socio-cultural environment
 - (b) Define strategic vision.
 - (c) Explain Divestment Strategy.
 - (d) Explain Transformational leadership style.
 - (e) Cash cows in BCG matrix.
3. Explain in brief the different levels of strategic management.
4. Described in detail the SWOT analysis. Also explain the significance of SWOT analysis in an organization.
5. Why do organizations undertake portfolio analysis?
6. Define Six Sigma. Explain in brief the themes of Six Sigma.
7. In what terms organization is related with environment?
8. Write an explanatory note on strategic business units.
9. What is supply chain management? Is it same as logistics management? Discuss.
10. Explain how technological factors present an opportunity as well as threat to a particular business organization.
11. Explain the concept of value chain analysis.

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12. What are the various bases on which an existing firm can diversify strategically?
13. What is TQM? Compare it with traditional management practices.
14. X The Value Chain Company is one of the largest Companies in the world and has been a huge success in a very short span of time. The key components which contributed to the huge success of the Company are that it offers cheap prices than its competitors, includes firm infrastructure like economic culture, no regional offices and pleasant environment to work. Management conducts various visits and it is learnt there are no rehearsals before any meeting which is usually scheduled on every saturday. In any organization, human resource is the key to development and X Company efficiently manages its sources. X Company terms its employees as associates. Manager compensation is related to the profit of store operated by him, within promotions, compensation offered to associates depending on company's profits and also offered some incentives on their performances. The workforce at X Company's not unionized as the company takes all the measures of their benefits and provides them training on related issues. Technology plays a vital role in development of the organization and X Company is well equipped with technological innovations like electronic check out at point of sale, store performance tracking, real time market research, satellite system and universal product code. The other factors that enhance the margin of profit for X Company are inbound logistics with frequent replacement, automated data capture solutions, flow of goods in an unbroken sequence from receiving to dispatching by eliminating storage, electronic data interchange etc. X Company's strategy in terms of its operation is very unique as it applies various methods like opening big stores in small towns with monopoly in the market at low rental costs, local prices, encashing brand name, concentric expansion, little space for inventory, store within store, etc. Store managers have made responsible as they are given liability to fix the range of pricing. All the above factors combined together increases the margin of profits through bulk sales. At the same time it has helped to boost the confidence level of customers with services like point of sale information system and everyday low prices.

QUESTIONS

1. What are the key factors responsible for X Company's success?
2. What do you mean by competitive advantage? Also mention the competitive advantage of X Company?
3. What strategies were followed by X Company to outmaneuver competitors?

SUGGESSTED ANSWERS/HINTS

1. (a) **Incorrect:** An opportunity is not an inherent capacity of any organization. It is a favourable condition in the organization's environment which enables it to consolidate and strengthen its position. An example of an opportunity is growing demand for the products or services that a company provides.

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- (b) **Correct:** The term PESTLE is used to describe a framework for analysis of macro environmental factors. PESTLE analysis involves identifying the 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.
- (c) **Incorrect:** Retrenchment strategy is implemented by redefining its business by divesting a major product line or market. Retrenchment or retreat becomes necessary or expedient for coping with particularly hostile and adverse situations in the environment and when any other strategy is likely to be suicidal.
- (d) **Correct:** Changes in strategy 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.
- (e) **Incorrect:** SWOT analysis presents the information about both external and internal environment in a structured form to compare external opportunities and threats with internal strengths and weaknesses. This helps in matching external and internal environments so that strategic decision makers in an organisation can come out with suitable strategies by identifying patterns of relationship and develop suitable strategies.
- (f) **Correct:** A firm pursuing a cost-leadership strategy attempts to gain a competitive advantage primarily by reducing its economic costs below its competitors. A successful cost leadership strategy usually permeates the entire firm, as evidenced by high efficiency, low overhead, limited perks, intolerance of waste, intensive screening of budget requests, wide spans of control, rewards linked to cost containment, and broad employee participation in cost control efforts.
- (g) **Incorrect:** Demarketing is a marketing strategy to reduce demand temporarily or permanently-the aim is not to destroy demand, but only to reduce or shift it. This happens when the demand is too much to handle. For example, buses are overloaded in the morning and evening, roads are busy for most of times, zoological parks are over-crowded on Saturdays, Sundays and holidays. Here demarketing can be applied to regulate demand.
- (h) **Correct:** Strong cultures in an organisation promote good strategy execution when there's fit and hurt execution when there's negligible fit. A culture grounded in values, practices, and behavioural norms that match what is needed for good strategy execution helps energize people throughout the company to do their jobs in a strategy-supportive manner, adding significantly to the power and effectiveness of strategy execution.
- (i) **Correct:** The Internet can be an economical means of delivering customer service. It provides innovative opportunities for handling customer service activities. Companies are discovering ways to deliver service online, thus curtailing the need

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to keep company personnel at the facilities of major customers, reducing staffing levels at telephone call centres, and cutting the time required for service technicians to respond to customer faxes and e-mail messages.

2. (a) 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. The core beliefs of a particular society tend to be persistent. It is difficult for businesses to change these core values, which becomes a determinant of its functioning.
- (b) A strategic vision delineates organisation's aspirations for the business, providing a panoramic view of the position where the organisation is going. A strategic vision points an organization in a particular direction, charts a strategic path for it to follow in preparing for the future, and moulds organizational identity. A Strategic vision is a road map of a company's future – providing specifics about technology and customer focus, the geographic and product markets to be pursued, the capabilities it plans to develop, and the kind of company that management is trying to create.
- (c) Divestment strategy involves the sale or liquidation of a portion of business, or a major division, profit centre or SBU. Divestment is usually a part of rehabilitation or restructuring plan and is adopted when a turnaround has been attempted but has proved to be unsuccessful. The option of a turnaround may even be ignored if it is obvious that divestment is the only answer.

A divestment strategy may be adopted due to various reasons:

- (i) A business that had been acquired proves to be a mismatch and cannot be integrated within the company.
 - (ii) Persistent negative cash flows from a particular business create financial problems for the whole company, creating the need for divestment of that business.
 - (iii) Severity of competition and the inability of a firm to cope with it may cause it to divest.
 - (iv) Technological upgradation is required if the business is to survive but where it is not possible for the firm to invest in it, a preferable option would be to divest.
 - (v) A better alternative may be available for investment, causing a firm to divest a part of its unprofitable businesses.
- (d) 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

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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.

- (e) 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.
- 3. Refer to chapter 2. 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. 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. 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.
- 4. Refer to Chapter 3. An organization need to work within a complex and often hostile environment. They need to generate a series of strategic alternatives, or choices of future strategies to pursue, given the company's internal strengths and weaknesses and its external opportunities and threats. The comparison of strengths, weaknesses, opportunities, and threats is normally referred to as a SWOT analysis.
 - ◆ Strength
 - ◆ Weakness
 - ◆ Opportunity
 - ◆ Threat

Students may explain the above points and bring out its significance. Strategies will help in creating a firm-specific business model that will best align, fit, or match a company's resources and capabilities to the demands of the environment in which it operates.

- 5. Refer to chapter 3. In order to analyse the current business portfolio, the company must conduct portfolio analysis (a tool by which management identifies and evaluates the various businesses that make up the company). In portfolio analyses top management views its product lines and business units as a series of investments from which it

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expects returns. A business portfolio is a collection of businesses and products that make up the company. The best business portfolio is the one that best fits the company's strengths and weaknesses to opportunities in the environment.

Portfolio analysis can be defined as a set of techniques that help strategists in taking strategic decisions with regard to individual products or businesses in a firm's portfolio. It is primarily used for competitive analysis and corporate strategic planning in multi product and multi business firms. They may also be used in less-diversified firms, if these consist of a main business and other minor complementary interests. The main advantage in adopting a portfolio approach in a multi-product, multi-business firm is that resources could be channelised at the corporate level to those businesses that possess the greatest potential. For instance, a diversified company may decide to divert resources from its cash-rich businesses to more prospective ones that hold promise of a faster growth so that the company achieves its corporate level objectives in an optimal manner.

In order to design the business portfolio, the business must analyse its current business portfolio and decide which business should receive more, less, or no investment. Depending upon analyses businesses may develop growth strategies for adding new products or businesses to the portfolio.

There are three important concepts, the knowledge of which is a prerequisite to understand different models of portfolio analysis is Strategic Business Unit, Experience Curve and Product Life Cycle.

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

It is a highly disciplined process that helps in developing and delivering near-perfect products and services. It strives to meet and improve organizational goals on quality, cost, scheduling, manpower, new products and so on. It works continuously towards revising the current standards and establishing higher ones. Six sigma has its base in the concept of probability and normal distribution in statistics. Six sigma strives that 99.99966% of products manufactured are defect free.

Six themes of six sigma

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

- **Theme one** – genuine focus on the customer
- **Theme two** – data and fact-driven management
- **Theme three** – processes are where the action is
- **Theme four** – proactive management
- **Theme five** – boundaryless collaboration
- **Theme six** – drive for perfection; tolerate failure

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7. Refer to chapter 1. In delineating the relationship between the organization and the environment, one has to be clear on the diversity of both these entities. On the one hand, the nature of relationship depends on the size of the organization, its age, the nature of business, the nature of ownership, degree of professionalization of management, etc. On the other hand, the relationship depends on the fact whether the external environmental elements behave in a random or structured manner (uncertainty v. predictability), whether such elements are placid or turbulent, whether they are slow-changing or fast changing, whether they are simple or complex, and so forth. The degree of interaction between the organization and the external environment is set by the above characteristics. It follows therefore that all organizations do not behave in the same way in relation to their external environment. Their structures and functions are shaped in tune with the demands of the external environment.

The relationship between the organization and its environment may be discussed in terms of interactions between them in several major areas which are outlined below:

- Exchange of information
- Exchange of resources
- Exchange of influence and power

8. Refer to chapter 6. In modern times, many big organizations structure their businesses into appropriate strategic business units (SBUs). An SBU is a grouping of related businesses, which is amenable to composite planning treatment. As per this concept, a multi-business enterprise groups its businesses into a few distinct business units in a logical manner. The purpose is to provide effective strategic planning treatment to each one of its products/businesses.

The three most important characteristics of SBU are:

- It is a single business or a collection of related businesses which offer scope for independent planning and which might feasibly stand alone from the rest of the organization.
- Has its own set of competitors.
- Has a manager who has responsibility for strategic planning and profit performance, and who has control of profit-influencing factors.

The identification of SBUs is a convenient starting point for planning since once the company's strategic business units have been identified, the responsibilities for strategic planning can be more clearly assigned.

9. Refer to chapter 5. The term supply chain refers to the linkages between suppliers, manufacturers and customers. Supply chains involve all activities like sourcing and procurement of material, conversion, and logistics. Planning and control of supply chains are important components of its management. Naturally, management of supply chains include closely working with channel partners – suppliers, intermediaries, other service providers and customers.

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Supply chain management is defined as the process of planning, implementing, and controlling the supply chain operations. It is a cross-functional approach to managing the movement of raw materials into an organization and the movement of finished goods out of the organization toward the end-consumer who are to be satisfied as efficiently as possible. It encompasses all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption. Organizations are finding that they must rely on the chain to successfully compete in the global market.

Is logistic management same as supply chain management?

Supply chain management is an extension of logistic management. However, there is difference between the two. Logistical activities typically include management of inbound and outbound goods, transportation, warehousing, handling of material, fulfilment of orders, inventory management, supply/demand planning. Although these activities also form part of Supply chain management, the latter has different components. Logistic management can be termed as one of its part that is related to planning, implementing, and controlling the movement and storage of goods, services and related information between the point of origin and the point of consumption.

Supply chain management includes more aspects apart from the logistics function. It is a tool of business transformation and involves delivering the right product at the right time to the right place and at the right price. It reduces costs of organizations and enhances customer service.

10. Refer to chapter 1. 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 enterprise's costs, profitability, plant location decisions, product lines, growth and development.

The technology and business are highly interrelated and interdependent also. 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. For example, an innovative and modern production system can act as weakness if the business is not able to change their production system. 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.

11. Refer to chapter 6. Value chain analysis has been widely used as a means of describing the activities within and around an organization, and relating them to an assessment of

the competitive strength of an organization (or its ability to provide value-for-money products or services). Value analysis was originally introduced as an accounting analysis to shed light on the 'value added' of separate steps in complex manufacturing processes, in order to determine where cost improvements could be made and/or value creation improved. These two basic steps of identifying separate activities and assessing the value added from each were linked to an analysis of an organization's competitive advantage by Michael Porter.

One of the key aspects of value chain analysis is the recognition that organizations are much more than a random collection of machines, money and people. These resources are of no value unless deployed into activities and organised into routines and systems which ensure that products or services are produced which are valued by the final consumer/user.

- 12.** Refer to chapter 4. Diversification endeavours can be related or unrelated to existing businesses of the firm. Based on the nature and extent of their relationship to existing businesses, diversification endeavours have been classified into four broad categories:

- (i) Vertically integrated diversification
- (ii) Horizontally integrated diversification
- (iii) Concentric diversification
- (iv) Conglomerate diversification

- 13.** Refer to chapter 7. Total Quality Management is a people focused management system that aims at continual increase in customer satisfaction at continually lower real cost.

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.

TQM and traditional management practices

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
- Changing Relationships with Customers and Suppliers
- Organizational Structure
- Organizational Change

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- Teamwork
- Motivation and Job Design

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

In part (a) students may write about the factors which are responsible for the success of X company whether it may be offering cheap prices than its competitors, its human resource, its technical innovations, its marketing strategies etc.

In part (b) write about the meaning of competitive advantage. Further, students should explain the points where the X Company gets edge over its competitors. What strategies are being taken by the company to avail competitive advantage?

In part (c) students should find out that what strategies are being followed by X Company to cope up with its competitors. Then explain these strategies with context to X Company.

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