2

Information Systems Concepts

Basic Concepts

1. System: A system is a group of inter connected components working towards the accomplishment of a common goal by accepting inputs and producing outputs in an ordered transformation process.

2. Classification of Systems: System can be classified based on various parameters like elements, interactive behavior, degree of human intervention and working output as shown in Fig. 2.1.

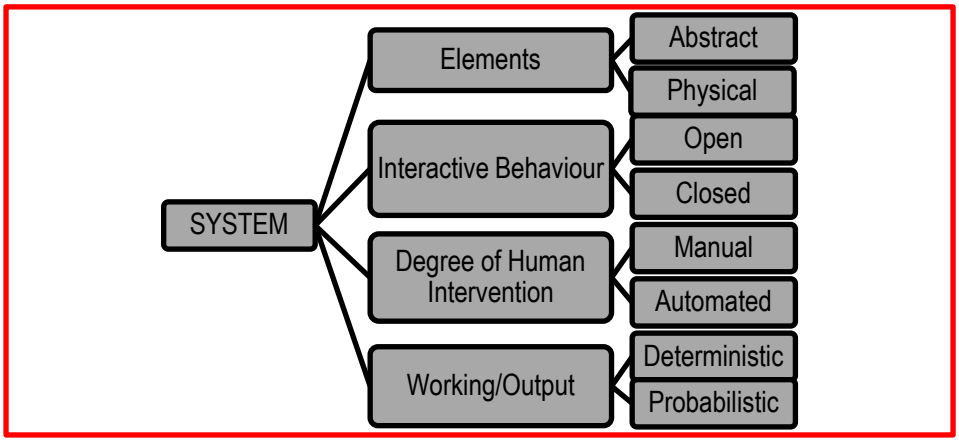

Fig. 2.1: Classification of System

2.1 Based on Elements: Abstract System also known as **Conceptual System or Model** can be defined as an orderly arrangement of interdependent ideas or constructs. For example, a system of theology is an orderly arrangement of ideas about God and the relationship of humans to God. On the other hand, **Physical system** is a set of tangible elements, which operated together to accomplish an objective e.g. Computer system, University system etc.

2.2 Based on Interactive behavior: An **Open system** interacts with other systems in its environment whereas a **Closed system** does not interact with the environment and does not change with changes in environment. For example; Information system is an open system because it takes input from the environment and produces output to the environment, which changes as per the changes in the environment. Consider a 'throw-

away' type sealed digital watch, which is a system, composed of a number of components that work in a cooperative fashion designed to perform some specific task. This watch is a closed system as it is completely isolated from its environment for its operation.

2.3 Based on degree of Human intervention: In a M**anual System** the data collection, maintenance and final reporting is done by human whereas it is carried out by computer system or say machine itself in the case of **automated system**.

2.4 Based on Working/Output: A **Deterministic System** operates in a predictable manner whereas **Probabilistic System** can be defined in terms of probable behavior. For example; software that performs on a set of instructions is a deterministic system whereas inventory system is a probabilistic system where the average demand, average time for replenishment, etc. may be defined, but the exact value at any given time is not known.

3. Information Systems and its Components: With the help of Information Systems, enterprises and individuals can use computers to collect, store, process, analyze, and distribute information. An information system comprises people, hardware, software, data and network for communication support as shown in Fig. 2.2.

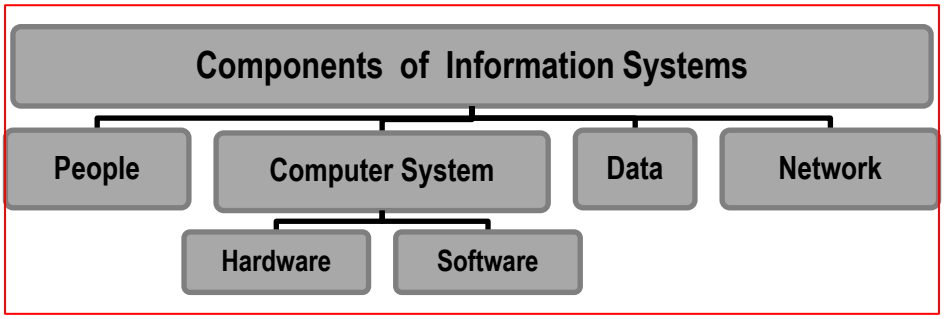

Fig. 2.2: Components of Information Systems

4. Types of Information Systems: Conceptually, information systems are categorized as follows:

4.1 Operations Level Systems: Operations Level Systems produce a variety of information for internal and external use. Their role is to effectively process business transactions, control industrial processes, support enterprise communications and collaborations and update corporate database. The main objective of OSS is to improve the operational efficiency of the enterprise. These are further categorized as follows:

(A) Transaction Processing Systems (TPS) - At the lowest level of management, TPS is an information system that manipulates data from business transactions. Any business activity such as sales, purchase, production, delivery, payments or receipts involves transaction and these transactions are to be organized and manipulated to generate various information products for external use. For example,

selling a product to a customer will give rise to the need of further information like customer billing, inventory status and increase in account receivable balance. TPS will thus record and manipulate transaction data into usable information.

TPS Components: The principal components of a TPS include inputs, processing, storage and outputs. The components or elements are part of both manual and computerized systems.

Features of TPS: Basic features of TPS are: Large volume of data, Automation of basic operations, Benefits are easily measurable, Source of input for other systems.

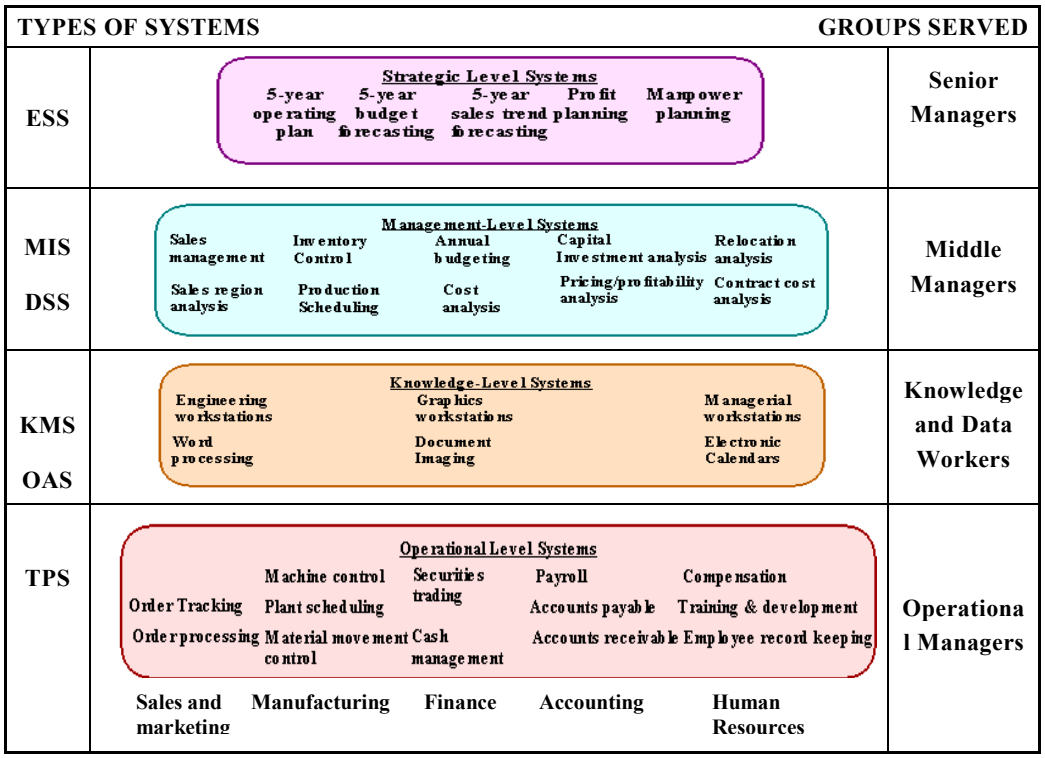

Fig. 2.3: Types of Information Systems

4.2 Knowledge – Level Systems: These systems support discovery, processing and storage of knowledge and data workers. These support the business to integrate new knowledge into the business and control the flow of paperwork and enable group working.

(A) Office Automation Systems (OAS) – It is most rapidly expanding computer based information systems. Different office activities can be broadly grouped into the following types of operations: Document Capture, Document Creation, Receipts and Distribution, Filling, Search, Retrieval and Follow up, Calculations, Recording Utilization of Resources.

Benefits of OAS can improve communication, reduce the cycle time between preparation of messages and receipt of messages at the recipients' end; reduce the costs of office communication both in terms of time spent by executives and cost of communication links and also ensure accuracy of information and smooth flow of communication. All the activities mentioned have been made very simple, efficient and effective by the use of computers. The application of computers to handle the office activities is also termed as office automation.

Computer based Office Automation Systems: Major computer based OAS are: Text Processing Systems, Electronic Document Management System, Electronic Message Communication Systems, Teleconferencing and Video-conferencing Systems.

(B) Knowledge Management Systems – Knowledge Management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge. It refers to a multi-disciplined approach to achieving organizational objectives by making the best use of knowledge. Knowledge Management Systems (KMS) refers to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the KM process. **Explicit** and **Tacit** are two types of knowledge.

- **Explicit knowledge:** Explicit knowledge is that which can be formalized easily and consequently is easily available across the organization.
- **Tacit knowledge:** Tacit knowledge, on the other hand, resides in a few often-in just one person and hasn't been captured by the organization or made available to others.

4.3 Management Level Systems: It supports the middle managers in monitoring, decision-making and administrative activities. It provides periodic reports rather than instant information on operations. For example- a college control system gives report on the number of leaves availed by the staff, salary paid to the staff, funds generated by the fees, finance planning etc. These are generally categorized into - **Management Information System (MIS)** and **Decision Support Systems (DSS)**. Each of them is briefly discussed below:

(A) Management Information Systems (MIS) – MIS has been defined by Davis and Olson as "An integrated user-machine system designed for providing information to support operational control, management control and decision making functions in an organization". Another notable definition of MIS is **"***MIS is a computer based system that provides flexible and speedy access to accurate data".* MIS support the managers at different levels to take strategic (at top level) or tactical (at middle level) management decisions to fulfill the organizational goals.

Characteristics of an effective MIS: Major characteristic of an effective MIS are:

Management Oriented, Management Directed, Integrated, Common Data Flows, Heavy Planning Element, Sub System Concept, Common Database, Computerized.

Pre-requisites of an Effective MIS – The pre-requisites of an effective MIS are: Database, Qualified System and Management Staff, Support of Top Management, Control and maintenance of MIS.

(B) Decision Support System (DSS) – DSS is a type of computerized information system that supports business and organizational decision-making activities. A Decision Support System (DSS) can be defined as a system that provides tools to managers to assist them in solving semi-structured and unstructured problems in their own, somewhat personalized, way. A DSS is not intended to make decisions for managers, but rather to provide managers with a set of capabilities that enable them to generate the information required by them in making decisions. A DSS supports the human decision-making process, rather than a means to replace it.

Planning languages: General-purpose planning languages, Special-purpose planning languages.

Components of DSS – A DSS comprise of four basic components, which are:

- **The user:** Manager, Staff Specialist (Analysts)
- **Databases:** Database is implemented at three levels: Physical level, Logical Level, External level.
- **Model base:** The planning language in a DSS allows the user to maintain a dialogue with the model base, which is the "brain" of DSS because it performs data manipulations and computations with the data provided to it by the user and the database.

Difference between DSS and traditional MIS: Major differences between DSS and traditional MIS are shown in following Table 2. 1.

Table 2.1: Difference between DSS and Traditional MIS

Dimensions	DSS	Traditional MIS
Philosophy	Providing integrated tools, data, models, and languages to end users	Providing structured information to end users
Orientation	External orientation	Internal orientation
Flexibility	Highly flexible	Relatively inflexible
Analytical capability	More analytical capability	Little analytical capability
System analysis	Emphasis on tools to be used in decision process	Emphasis on information requirement analysis
System design	Interactive process	System development based on static information requirements

4.4 Strategic Level Systems: It supports the senior level management to tackle and address strategic issues and long term trends, both inside organization and the outside world.

(A) Executive Information Systems (EIS) – It is sometimes referred to as an Executive Support System (ESS). It serves the strategic level i.e. top level managers of the organization. ESS creates a generalized computing and communications environment rather than providing any preset applications or specific competence.

The Executive Decision-Making Environment – The type of decisions that executives must make are very broad. Often, executives make these decisions based on a vision they have regarding 'what it will take to make their enterprise successful.' Some of the characteristics of the types of information used in executive decision making are: Lack of structure, High degree of uncertainty, Future orientation, Informal Source, Low level of detail.

4.5 Specialized Systems: Apart from the information systems discussed above, there exists other categories of information systems also that support either operations or management applications. Some of them are Expert Systems, Cross Functional Information Systems, and Core Banking System (CBS) etc. These are briefed as follows:

(A) Expert Systems - An Expert System is highly developed DSS that utilizes knowledge generally possessed by an expert to solve a problem. Expert Systems are software systems that imitate the reasoning processes of human experts and provide decision makers with the type of advice they would normally receive from such experts. A characteristic of expert systems is the ability to declare or explain the reasoning process that was used to make decisions.

(B) Cross Functional Information Systems – It is also known as integrated information system that combines most of information systems and designed to produce information and support decision making for different levels of management and business functions. Example – Enterprise Resource Planning (ERP).

Enterprise Resource Planning (ERP) - Enterprise Resource Planning (ERP) is process management software that allows an organization to use a system of integrated applications to manage the business and automate many back-office functions related to technology, services and human resources. ERP software integrates all facets of an operation, including product planning, development, manufacturing, sales and marketing.

(C) Core Banking System - Core Banking System (CBS) may be defined as a back-end system that processes daily banking transactions, and posts updates to accounts and other financial records. These systems typically include deposit, loan and credit-processing capabilities, with interfaces to general ledger systems and reporting tools. Core banking functions differ depending on the specific type of

bank. Examples of core banking products include Infosys' Finacle, Nucleus FinnOne and Oracle's Flexcube application (from their acquisition of Indian IT vendor i-flex).

5. Based on the aforementioned facts, the following Table 2.2 describes all the major information systems at-a-glance.

Table 2.2: Different Information Systems

Information System	Description
Transaction Processing Systems (TPS)	These are designed to process and carry out routine transactions efficiently and accurately. A business will have several TPS. For example, Billing systems and invoices to customers, to calculate the weekly and monthly payroll and tax payments of an organization, to calculate raw material requirements, stock control systems to process all movements into, within and out of the business etc.
Office Automation Systems (OAS)	These are systems that help in the enhancement of performance of or productivity of employees who are dealing with the data processing and information. For example, the use of MS-Office can generate the list of customers who have done purchase of certain type of products, number of sales of products done on a particular date etc.
Knowledge Management Systems (KMS)	These help businesses in creation and sharing of information and are typically used in a business where employees create new knowledge and expertise, which can then be shared by other people in the enterprise to create further commercial opportunities. For example, KMS are most effectively used in firms of lawyers, accountants and management consultants. One can say that these are effective in systems, which allow efficient categorization and distribution of knowledge. For example, Knowledge discovery in database and Data mining tools can be used to extract the knowledge from word processing documents, spread sheets, PowerPoint presentations, internet pages, databases, data warehouses.
Decision Support Systems (DSS)	These are specifically designed to help management to make decisions in situations where there is uncertainty about the possible outcomes of those decisions. DSS consists of tools and techniques that gather relevant information and helps in analysis of the options and alternatives. It usually uses complex spread sheet and databases to generate information.
Management Information Systems (MIS)	It is mainly concerned with internal sources of information. It inputs data usually from the transaction processing systems and gives output as a series of management reports. MIS reports can be used by middle management and operational supervisors to gather desired information.
Executive	Executive Support System (ESS) is a reporting tool (software) that

Support System (ESS)	allows us to turn our organization's data into useful summarized reports. These reports are generally used by executive level managers for quick access to reports coming from all company levels and departments such as billing, cost accounting, staffing, scheduling, and more.

6. Application of Information Systems in Enterprise Processes: Information systems perform following three vital roles in business firms:

- "*Support an organization's business processes and operations":* This includes operations support systems such as Transaction Processing Systems, Process Control Systems.
- *"Support business decision-making":* This includes Management Information Systems, Decision Support Systems, and Executive Information Systems.
- *"Support strategic competitive advantage":* This includes Expert Systems, Knowledge Management Systems, Strategic Information Systems, and Functional Business Systems.

To operate Information Systems (IS) effectively and efficiently, a business manager should have knowledge about Foundation Concepts, Information Technologies (IT), Business Applications, Development Processes, and Management Challenges.

The primary areas where IT enabled tools are used in any organization is shown in Fig. 2.4 whereas Fig. 2.5 showcases different IT enabled tools used at three layers i.e. top, middle and lower management of an organization.

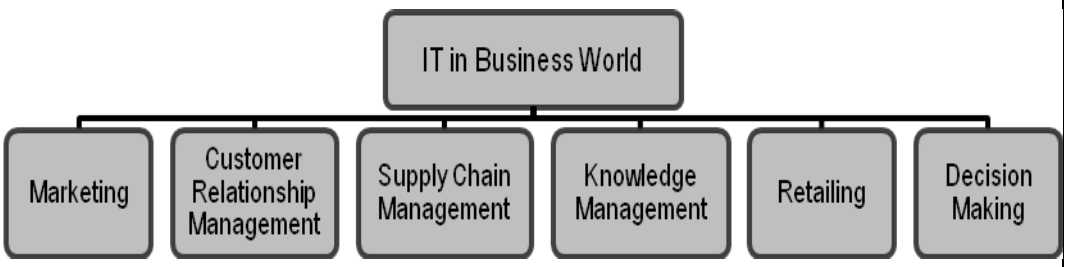

Fig. 2.4: IT in Prime Business Areas

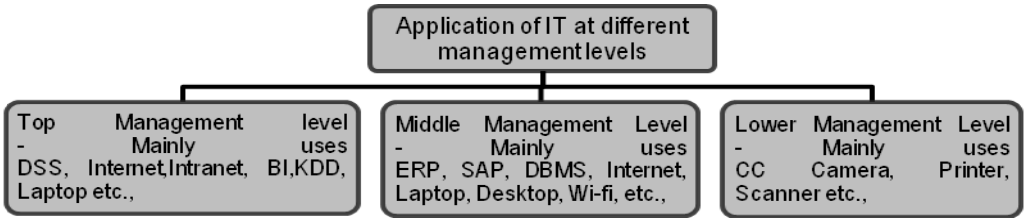

Fig. 2.5: Application of IT at Different Management Levels

7. Information: Technically, Information means processed data. Data consists of facts, values or results, and information is the result of relations between data e.g. in a spread sheet, student name, roll number and marks obtained in science and arts subjects represent data, whereas the graph that shows the percentage of students, who acquired more than 80% in science subjects and 65% in arts subjects represents information. Information may be represented in the form of text, graph, pictures, voice, videos etc.

Information is data that have been put into a meaningful and useful context. Mere collection of data is not information and mere collection of information is not knowledge.

7.1 Attributes of Information: These are - Availability, Purpose, Mode and Format, Decay-Rate, Frequency, Completeness, Reliability, Cost-benefit Analysis, Validity, Quality, Transparency, and Value of Information.

8. Role of Information in Business: The information can be categorized on the basis of its requirement by the top, middle and lower level management as seen in Fig. 2.6. The top management generally comprise of owners/shareholders, board of directors, its chairman, managing director, or the chief executive, or the managers committee having key officers, the middle management comprise of heads of functions departments e.g. purchase manager, production manager, marketing managers, financial controller, and divisional sectional officers working under these functional heads, whereas the lower level managers are superintendents, supervisor, etc.

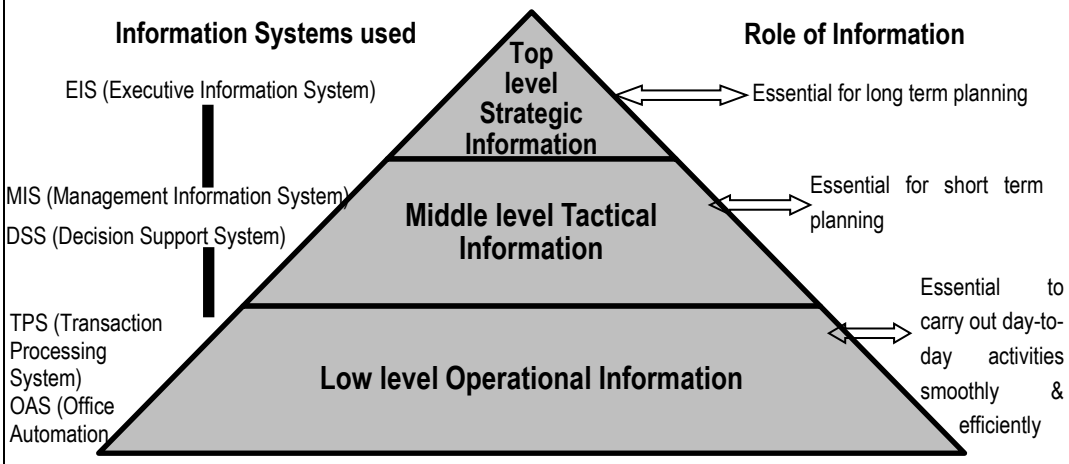

Fig. 2.6: Types of Information Systems at Different Management Levels

9. Relative Importance of Information Systems from Strategic and Operational Perspectives:

In this age of technology and competition, enterprises are looking for novel ideas and information that can enhance and expand their business. In order to achieve this, they are becoming more and more dependent on information systems. Information system is used in every aspects of business right from customer relationship management, marketing strategies, retailing, communication, product promotion, product development, forecast future sales to supply chain management etc. ERP, Data Mining tools, Data warehouse, Business

intelligence, MIS, internet, intranet, extranet etc. are the information systems and information technologies that support managers in every step of business.

Information Systems have accelerated the pace of processing of enterprise information using IT and integrating all aspects of the operations of the business e.g. instead of gathering data manually and taking out hidden information from it by conducting meeting of executives, which is crucial in decision making for marketing strategies, customer relationship management etc., the same can be obtained by using the respective data mining tools and data warehouse. Not only this, Information System also provides new platform to business world where space and time is no more obstacle. For example, selling and purchasing of products can be done on web any time and from anywhere.

10. Overview of Underlying IT Technologies: Major IT tools crucial for business growth are: Business Website, Internet and Intranet, Software Packages, Computer Systems, Scanners, Laptop, Printer, Webcam, Smart Phone etc.

Question 1

Define the following terms briefly:

(a) Abstract System
(b) Physical System
(c) Open System
(d) Closed System
(e) Deterministic System
(f) Probabilistic System

Answer

(a) Abstract System: Abstract System also known as Conceptual System or Model can be defined as an orderly arrangement of interdependent ideas or constructs. For example, a system of theology is an orderly arrangement of ideas about God and the relationship of humans to God.

(b) Physical System: Physical System is a set of tangible elements, which operate together to accomplish an objective e.g. Computer system, University system etc.

(c) Open System: An Open System interacts with other systems in its environment and changes with changes in the environment. For example; Information system is an open system because it takes input from the environment and produces output to the environment, which changes as per the changes in the environment.

(d) Closed System: A Closed System does not interact with the environment and does not change with the changes in environment. Consider a 'throw-away' type sealed digital watch, which is a system, composed of a number of components that work in a cooperative fashion designed to perform some specific task. This watch is a closed system as it is completely isolated from its environment for its operation.

(e) Deterministic System: A Deterministic System operates in a predictable manner. For example; software that performs on a set of instructions is a deterministic system.

(f) Probabilistic System: A Probabilistic System can be defined in terms of probable behaviour. For example; inventory system is a probabilistic system where the average demand, average time for replenishment, etc. may be defined, but the exact value at any given time is not known.

Question 2

Discuss important characteristics of Computer based Information Systems in brief.

Answer

Major characteristics of Computer based Information Systems are given as follows:

- All systems work for predetermined objectives and the system is designed and developed accordingly.
- In general, a system has a number of interrelated and interdependent subsystems or components. No subsystem can function in isolation; it depends on other subsystems for its inputs.
- If one subsystem or component of a system fails; in most of the cases, the whole system does not work. However, it depends on 'how the subsystems are interrelated'.
- The way a subsystem works with another subsystem is called interaction. The different subsystems interact with each other to achieve the goal of the system.
- The work done by individual subsystems is integrated to achieve the central goal of the system. The goal of individual subsystem is of lower priority than the goal of the entire system.

Question 3

What do you understand by TPS? Briefly discuss the key activities involved in a TPS.

Answer

Transaction Processing System (TPS): At the lowest level of management, TPS is an information system that manipulates data from business transactions. Any business activity such as sales, purchase, production, delivery, payments or receipts involves transaction and these transactions are to be organized and manipulated to generate various information products for internal and external use. For example, selling of a product to a customer will give rise to the need of further information like customer billing, inventory status and increase in account receivable balance. TPS will thus record and manipulate transaction data into usable information.

Major activities involved in a TPS are given as follows:

- Capturing data and organizing in files or databases;
- Processing files/databases using application software;
- Generating information in the form of reports; and

- Processing queries from various quarters of the organization.

Question 4

Discuss in brief, the principal components of a Transaction Processing System (TPS).

Answer

The principal components of a Transaction Processing System (TPS) are as follows:

- **Inputs –** Source documents, such as customer orders, sales, slips, invoices, purchase orders, and employee time cards, are the physical evidence of inputs in to the Transaction Processing System. They serve several purposes like capturing data, facilitating operations by communicating data and authorizing another operation in the process, standardizing operations by indicating, which data require recording and what actions need to be taken and providing a permanent file for future analysis, if the documents are retained etc. Input of transactions may also be done in electronic form e.g. swiping and attendance card.
- **Processing –** This involves the use of journals and registers to provide a permanent and chronological record of inputs. Journals are used to record financial accounting transactions, and registers are used to record other types of data not directly related to accounting. Some of the common journals are sales journal, purchase journal, cash receipts journal etc.
- **Storage –** Ledgers and files provide storage of data on both manual and computerized systems. The general ledger, the accounts payable ledger, and the accounts receivable ledger are some of the records of a firm's financial accounting transactions.
- **Outputs –** Any document generated from the system is output. Some documents are both output and input. For example; a customer invoice is an output from the order-entry application system and also and input document to the customer. Financial reports summarize the results of transaction processing and express these results in accordance with the principles of financial reporting.

Question 5

Explain basic features of a Transaction Processing System (TPS) in brief.

Answer

Basic features of Transaction Processing System (TPS) are as follows:

- **Large volume of data-** As TPS is transaction oriented and generally consists of large volumes of data, it requires greater storage capacity. Their primary objective is to ensure that the data regarding the economic events in the enterprises are captured quickly and correctly.
- **Automation of basic operations-** Any TPS aims at automating the basic operations of a business enterprise and plays a critical role in its day-to-day functioning. Any failure in

the TPS for a short period of time can play havoc with the functioning of the enterprise. Thus, TPS is an important source of up-to-date information regarding the operations of the enterprise.

- **Benefits are easily measurable-** TPS reduces the workload of the people associated with operations and improves their efficiency by automating some of the operations. Most of these benefits of the TPS are tangible and easily measurable. Therefore, cost benefit analysis regarding the desirability of TPS is easy to conduct. As the benefits from TPS are mainly tangible, user acceptance is easy to obtain.
- **Source of input for other systems-** TPS is the basic source of internal information for other information systems. Heavy reliance by other information systems on TPS for this purpose makes TPS important for tactical and strategic decisions as well.

Question 6

What do you understand by MIS? Discuss major characteristics of an effective MIS.

Or

'Management Information Systems (MIS) supports the managers at different levels to take decisions to fulfill the organizational goals.' Explain the major characteristics of MIS to achieve these goals.

Answer

Management Information Systems (MIS): MIS has been defined by Davis and Olson as "An integrated user-machine system designed for providing information to support operational control, management control and decision making functions in an organization". Another notable definition of MIS is "MIS is a computer based system that provides flexible and speedy access to accurate data".

MIS support managers at different levels to take strategic (at top level) or tactical (at middle level) management decisions to fulfill organizational goals. Nature of MIS at different levels has different flavors and they are available in the form of reports, tables, graphs and charts or in presentation format using some tools. MIS at the top level is much more comprehensive but is condensed or summarized compared to the information provided to those at middle level management. MIS can help in making effective, structured reports relevant for decisions of day-to-day operations. These reports and displays can be made available on demand, periodically or whenever exceptional conditions occur.

Characteristics of an effective MIS: Major characteristics of an effective MIS are given as follows:

- **Management Oriented:** It means that efforts for the development of the Information System should start from an appraisal of management needs and overall business objectives. Such a system is not necessarily for top management only but may also meet the information requirements of middle level or operating levels of management.

- **Management Directed:** Because of management orientation of MIS, it is necessary that management should actively direct the system's development efforts. For system's effectiveness, it is necessary for management to devote sufficient amount of their time not only at the stage of designing the system but for its review as well to ensure that the implemented system meets the specifications of the designed system.
- **Integrated:** The best approach for developing information systems is the integrated approach as all the functional and operational information sub-systems are to be tied together into one entity. An integrated Information system has the capability of generating more meaningful information to management as it takes a comprehensive view or a complete look at the interlocking sub-systems that operate within a company.
- **Common Data Flows:** It means the use of common input, processing and output procedures and media whenever required. Data is captured by the system analysts only once and as close to its original source as possible. Afterwards, they try to utilize a minimum of data processing procedures and sub-systems to process the data and strive to minimize the number of output documents and reports produced by the system. This eliminates duplication in data collections, simplifies operations and produces an efficient information system.
- **Heavy Planning Element:** An MIS usually takes one to three years and sometimes even longer to get established firmly within a company. Therefore, a MIS designer must be present while development of MIS and should consider future enterprise objectives and requirements of information as per its organization structure.
- **Sub System Concept:** Even though the information system is viewed as a single entity, it must be broken down into digestible sub-systems, which can be implemented one at a time in a phased plan. The breaking down of MIS into meaningful sub-systems sets the stage for this phasing plan.
- **Common Database:** Database is the mortar that holds the functional systems together. It is defined as a "super-file", which consolidates and integrates data records formerly stored in many separate data files. The organization of a database allows it to be accessed by several information sub-systems and thus, eliminates the necessity of duplication in data storage, updating, deletion and protection.
- **Computerized:** Though MIS can be implemented without using a computer; the use of computers increases the effectiveness of the system. In fact, its use equips the system to handle a wide variety of applications by providing their information requirements quickly. Other necessary attributes of the computer to MIS are accuracy and consistency in processing data and reduction in clerical staff. These attributes make computer a prime requirement in MIS.

Question 7

Briefly discuss major misconceptions about Management Information Systems (MIS).

Answer

Following are the major misconceptions about Management Information Systems (MIS):

- Any computer based information system is a MIS.
- Any reporting system is MIS.
- MIS is a management technique.
- MIS is a bunch of technologies.
- MIS is an implementation of organizational systems and procedures. It is a file structure.
- The study of MIS is about use of computers.
- More data in reports generated results in more information to managers.
- Accuracy plays vital role in reporting.

Question 8

'There are various constraints, which come in the way of operating an MIS'. Explain any four such constraints in brief.

Answer

Four major constraints, which come in the way of operating an MIS, are given as follows:

- Non-availability of experts, who can diagnose the objectives of the organization and provide a desired direction for installing a system, which operates properly. This problem may be overcome by grooming internal staff, which should be preceded by proper selection and training.
- Experts usually face the problem of selecting which sub-system of MIS should be installed and operated first. The criteria, which should guide the experts, depend its need and importance.
- Due to varied objectives of business concerns, the approach adopted by experts for designing and implementing MIS is no-standardized.
- Non-cooperation from staff is a crucial problem, which should be handled tactfully. This can be carried out by organizing lectures, showing films and also explaining to them the utility of the system. Besides this, some staff should also be involved in the development and implementation of the system to buy-in their participation.

Question 9

Explain in brief major limitations of Management Information Systems (MIS)? Explain in brief.

Answer

Major Limitations of Management Information Systems (MIS) are as follows:

- The quality of the outputs of MIS is basically governed by the quality of input and processes.
- MIS is not a substitute for effective management, which means that it cannot replace managerial judgment in making decisions in different functional areas. It is merely an important tool in the hands of executives for decision making and problem solving.
- MIS may not have requisite flexibility to quickly update itself with the changing needs of time, especially in fast changing and complex environment.
- MIS cannot provide tailor-made information packages suitable for every type of decision made by executives.
- MIS takes into account mainly quantitative factors, thus it ignores the non-quantitative factors like morale and attitude of members of organization, which have an important bearing on the decision making process of executives or senior management.
- MIS is less useful for making non-programmed decisions. Such decisions are not routine and thus require information, which may not be available from existing MIS.
- The effectiveness of MIS is reduced in enterprises, where the culture of hoarding information and not sharing with other is prevalent.
- MIS effectiveness decreases due to frequent changes in top management, organizational structure and operational team.

Question 10

What is Decision Support System (DSS)? Explain the key characteristics of a DSS in brief.

Answer

Decision Support System (DSS): A DSS can be defined as a system that provides tools to managers to assist them in solving semi-structured and unstructured problems in their own, somewhat personalized, way. A DSS is not intended to make decisions for managers, but rather to provide managers with a set of capabilities that enable them to generate the information required by them to make decisions. A DSS supports the human decision-making process, rather than becoming a means to replace it.

Characteristics of DSS: The key characteristics of a DSS are given as follows:

- This supports decision making and occurs at all levels of management.
- Instead of helping individuals working on independent tasks, it should be able to help groups in decision making.
- It should be flexible and adaptable. i.e. it should be able to fit itself in the style of a particular manager and ready to change according to changes in the environment.
- DSS focuses on decisions rather than data and information.

- It should be easy to use. A user should not need to have knowledge of computer programming to generate reports that help in decision making.
- DSS can be used for solving structured problems.
- DSS should be user-friendly.
- DSS should be extensible and evolve over-time.
- DSS is used mainly for decision making rather than communicating decisions and training purposes.
- The impact of DSS should be on decision where the manager's judgment is essential and there is sufficient structure suitable for using computer systems.

Question 11

Discuss various examples of Decision Support Systems (DSS) in Accounting.

Answer

Examples of Decision Support Systems (DSS) in Accounting: DSSs are widely used as a part of an organization's Accounting Information System. The complexity and nature of decision support systems vary. Many are developed in-house using either a general type of decision support program or a spreadsheet program to solve specific problems. Below are several illustrations:

- **Cost Accounting System:** The health care industry is well known for its cost complexity. Managing costs in this industry requires controlling costs of supplies, expensive machinery, technology, and a variety of personnel. Cost accounting applications help health care organizations calculate product costs for individual procedures or services. Decision support systems can accumulate these product costs to calculate total costs per patient. Health care managers many combine cost accounting decision support systems with other applications, such as productivity systems. Combining these applications allows managers to measure the effectiveness of specific operating processes. One health care organization, for example, combines a variety of decision support system applications in productivity, cost accounting, case mix, and nursing staff scheduling to improve its management decision making.
- **Capital Budgeting System:** Companies require new tools to evaluate high-technology investment decisions. Decision makers need to supplement analytical techniques, such as net present value and internal rate of return, with decision support tools that consider some benefits of new technology not captured in strict financial analysis. One decision support system designed to support decisions about investments in automated manufacturing technology is Auto Man, which allows decision makers to consider financial, nonfinancial, quantitative, and qualitative factors in their decision-making processes. Using this decision support system, accountants, managers, and engineers

identify and prioritize these factors. They can then evaluate up to seven investment alternatives at once.

- **Budget Variance Analysis System:** Financial institutions rely heavily on their budgeting systems for controlling costs and evaluating managerial performance. One institution uses a computerized decision support system to generate monthly variance reports for division comptrollers. The system allows these comptrollers to graph, view, analyze, and annotate budget variances, as well as create additional one-and five-year budget projections using the forecasting tools provided in the system. The decision support system thus helps the comptrollers create and control budgets for the cost-center managers reporting to them.
- **General Decision Support System:** As mentioned earlier, some planning languages used in decision support systems are general purpose and therefore have the ability to analyze many different types of problems. In a sense, these types of decision support systems are a decision-maker's tools. The user needs to input data and answer questions about a specific problem domain to make use of this type of decision support system. An example is a program called *Expert Choice***.** This program supports a variety of problems requiring decisions. The user works interactively with the computer to develop a hierarchical model of the decision problem. The decision support system then asks the user to compare decision variables with each other. For instance, the system might ask the user how important cash inflows are versus initial investment amount to a capital budgeting decision. The decision maker also makes judgments about which investment is best with respect to these cash flows and which requires the smallest initial investment. Expert Choice analyzes these judgments and presents the decision maker with the best alternative.

Question 12

What is Executive Information System (EIS)? Explain its major characteristics.

Answer

Executive Information Systems (EIS): It is sometimes referred to as an Executive Support System (ESS) too. It serves the strategic level i.e. top level managers of the organization. ESS creates a generalized computing and communications environment rather than providing any preset applications or specific competence.

Characteristics of EIS: Major Characteristics of an EIS are given as follows:

- EIS is a Computer-based-information system that serves the information need of top executives.
- EIS enables users to extract summary data and model complex problems without the need to learn query languages statistical formulas or high computing skills.
- EIS provides rapid access to timely information and direct access to management reports.
- EIS can access both internal and external data.

- EIS provides extensive online analysis tool like trend analysis, market conditions etc.
- EIS can easily be given as a DSS support for decision making.

Question 13

'There is a practical set of principles to guide the design of measures and indicators to be included in an EIS'. Explain those principles in brief.

Answer

The principles to guide the design of measures and indicators to be included in an EIS are given as follows:

- EIS measures must be easy to understand and collect. Wherever possible, data should be collected naturally as part of the process of work. An EIS should not add substantially to the workload of managers or staff.
- EIS measures must be based on a balanced view of the organization's objective. Data in the system should reflect the objectives of the organization in the areas of productivity, resource management, quality and customer service.
- Performance indicators in an EIS must reflect everyone's contribution in a fair and consistent manner. Indicators should be as independent as possible from variables outside the control of managers.
- EIS measures must encourage management and staff to share ownership of the organization's objectives. Performance indicators must promote both team-work and friendly competition. Measures will be meaningful for all staff, people feel that they, as individuals, can contribute to improving the performance of the organization.
- EIS information must be available in the organization. The objective is to provide everyone with useful information about the organization's performance. Information that must remain confidential be part of EIS.
- EIS measures must evolve to meet the changing needs of the organization.

Question 14

Discuss the difference between Executive Information System (EIS) and Traditional Information Systems.

Answer

Difference between EIS and Traditional Information Systems

Dimensions of Difference	Executive Information System	Traditional Information System
Level of management	For top or near top executives	For lower staff
Nature of Information	Specific issues/problems	Status reporting

Access	and aggregate reports	
Nature of information provided	Online tools and analysis	Offline status reporting
Information Sources	More external, less internal	Internal
Drill down facility to go through details at successive levels	Available	Not available
Information format	Text with graphics	Tabular
Nature of interface	User-friendly	Computer-operator generated

Question 15

What is an Expert System? Discuss some of the business implications of Expert Systems in brief.

Answer

Expert System: An Expert System is highly developed DSS that utilizes knowledge generally possessed by an expert to solve a problem. Expert System is software system that imitate the reasoning processes of human experts and provide decision makers with the type of advice they would normally receive from such experts. For instance, an expert system in the area of investment portfolio management might ask its user a number of specific questions relating to investments for a particular client like – how much can be invested. Does the client have any preferences regarding specific types of securities? And so on. Based on the answers given by client, it may suggest a suitable portfolio.

A characteristic of Expert System is its ability to declare or explain the reasoning process that was used to make decisions. Some of the business applications of Expert System are given as follows:

- **Accounting and Finance:** It provides tax advice and assistance, helping with credit-authorization decisions, selecting forecasting models, providing investment advice.
- **Marketing:** It provides establishing sales quotas, responding to customer inquiries, referring problems to telemarketing centers, assisting with marketing timing decisions, determining discount policies.
- **Manufacturing:** It helps in determining whether a process is running correctly, analyzing quality and providing corrective measures, maintaining facilities, scheduling job-shop tasks, selecting transportation routes, assisting with product design and facility layouts.
- **Personnel:** It is useful in assessing applicant qualifications, giving employees assistance in filling out forms.

- **General Business:** It helps in assisting with project proposals, recommending acquisition strategies, educating trainees, evaluating performance.

Question 16

What is the need for an Expert System in an organization? What are its benefits?

Answer

Major reasons for the need of Expert Systems are as follows:

- Expert labor is expensive and scarce. Knowledge workers' employees, who routinely work with data and information to carry out their day-to-day duties are not easy to find and keep and companies are often faced with a shortage of talent in key positions.
- Moreover, no matter how bright or knowledgeable certain people are, they often can handle only a few factors at a time.
- Both these limitations imposed by human information processing capability and the rushed pace at which business is conducted today put a practical limit on the quality of human decision making this putting a need for expert systems.

Major benefits of Expert Systems are given as follows:

- Expert Systems preserve knowledge that might be lost through retirement, resignation or death of an acknowledged company expert.
- Expert Systems put information into an active-form so that it can be summoned almost as a real-life expert might be summoned.
- Expert Systems assist novices in thinking the way experienced professionals do.
- Expert Systems are not subjected to such human fallings as fatigue, being too busy, or being emotional.
- Expert Systems can be effectively used as a strategic tool in the areas of marketing products, cutting costs and improving products.

Question 17

Discuss some of the important implications of Information Systems in business.

Answer

Following are some of the important implications of Information Systems in business:

- Information Systems help managers in efficient decision-making to achieve organizational goals.
- An organization will be able to survive and thrive in a highly competitive environment on the strength of a well-designed Information system.
- Information Systems help in making right decision at the right time i.e. just on time.

- A good Information System may help in generating innovative ideas for solving critical problems.
- Knowledge gathered though Information systems may be utilized by managers in unusual situations.
- Information System is viewed as a process; it can be integrated to formulate a strategy of action or operation.

Question 18

"Information has become a key resource for any type of business activity." Briefly discuss the various attributes of information.

Answer

Information: Technically, information means processed data that have been put into a meaningful and useful context. Data consists of facts, values or results, and information is the result of relation between data e.g. in a spread sheet student name, roll number and marks obtained in science and arts subjects represents data whereas the graph that shows the percentage of students, who acquired more than 80% in science subjects and 65% in arts subjects represents information. Information may be represented in the form of text, graph, pictures, voice, videos etc.

Mere collection of data is not information and mere collection of information is not knowledge. Information relates to description, definition, or perspective (what, who, when, where). Information is essential because it adds knowledge, helps in decision making, analyzing the future and acting in time. Information products produced by an information system can be represented by number of ways e.g. paper reports, visual displays, multimedia documents, electronic messages, graphics images, and audio responses.

Attributes of Information: Some of the important attributes of useful and effective information are given as follows:

- **Availability –** It is a very important aspect of information. Information is useless if it is not available at the time of need.
- **Purpose/Objective –** Information must have purposes/objective at the time it is transmitted to a person or machine, otherwise it is simple data. Depending upon the activities in an organization the Information communicated to people has a purpose. The basic objective of information is to inform, evaluate, persuade, and organize. This indeed helps in decision making, generating new concepts and ideas, identify and solve problems, planning, and controlling which are needed to direct human activity in business enterprises.
- **Mode and format –** The modes of communicating information to humans should be in such a way that it can be easily understand by the people. The mode may be in the form

of voice, text or a combination of these two. Format also plays an important role in communicating the idea. It should be designed in such a way that it assists in decision making, solving problems, initiating planning, controlling and searching. According to the type of information, different formats can be used e.g. diagrams, graphs, curves are best suited for representing statistical data. Format of information should be simple, relevant and should highlight important points but should not be too cluttered up.

- **Current/Updated –** The information should be refreshed from time to time as it usually rots with time and usage. For example, the running score sheet of a cricket match available in Internet sites should be refreshed at fixed intervals of time so that the current score will be available. Similar is the case with broker who wants the latest information about the stock market.
- **Rate –** The rate of transmission/reception of information may be represented by the time required to understand a situation. Useful information is the one which is transmitted at a rate which matches with the rate at which the recipient wants to receive. For example- information available from internet site should be available at a click of mouse, and one should not have to wait for it for an hour.
- **Frequency –** The frequency with which information is transmitted or received affects its value. For example- weekly reports of sales show little change as compared to the quarterly reports and contribute less for assessing salesman capability.
- **Completeness and Adequacy –** The information provided should be complete and adequate because only complete information can be used in policy making. For example- the position of student in a class can be found out only after having the information of the marks of all students and the total number of students in a class.
- **Reliability –** It is a measure of failure or success of using information for decision-making. If information leads to correct decision on many occasions, we say the information is reliable.
- **Validity –** It measures how close the information is to the purpose for which it asserts to serve. For example, the experience of employee does not support evaluating his performance.
- **Quality –** It means the correctness of information. For example, the correct status of inventory is highly required.
- **Transparency –** It is essential in decision and policy making. For example, giving only total amount of advances does not give true picture of utilization of funds for decision about future course of action; rather deposit-advance ratio may be more transparent information as it gives information relevant for decision making.

- **Value of information –** It is defined as difference between the value of the change in decision behavior caused by the information and the cost of the information. In other words, given a set of possible decisions, a decision-maker may select one on basis of the information at hand. If new information causes a different decision to be made, the value of the new information is the difference in value between the outcome of the old decision and that of the new decision, less the cost of obtaining the information.

Question 19

Briefly explain some of the properties that potential applications should possess to qualify for an Expert System development.

Answer

Major properties that an application should possess to qualify for Expert System development are given as follows:

- **Availability:** One or more experts can communicate 'how they go about solving the problems to which the Expert System will be applied'.
- **Complexity:** Solution of the problems for which the Expert Systems will be used is a complex task that requires logical inference processing, which would not be easily handled by conventional information processing.
- **Domain:** The domain, or subject area, of the problem is relatively small and limited to a relatively well-defined problem area.
- **Expertise:** Solutions to the problem require the efforts of experts. That is, only a few possess the knowledge, techniques, and intuition needed.
- **Structure:** The solution process must be able to cope with ill-structured, uncertain, missing, and conflicting data, and a dynamic problem-solving situation.

Question 20

Write a short note on 'Components of ERP Model'.

Answer

Components of Enterprise Resource Planning (ERP) are listed below:

(i) Software Component: The software component is the component that is most visible part and consists of several modules such as Finance, Human Resource, Supply Chain Management, Supplier Relationship Management, Customer Relationship, and Business Intelligence.

(ii) Process Flow: It is the model that illustrates the way how information flows among the different modules within an ERP system. By creating this model makes it easier to understand how ERP work.

(iii) **Customer mindset:** By implementing ERP system, the old ways for working which user understand and comfortable with must be changed and may lead to users' resistance. To lead ERP implementation to succeed, the company needs to eliminate negative value or belief that users may carry toward utilizing new system.

(iv) **Change Management:** In ERP implementation, change needs to be managed at several levels - User attitude; resistance to change; and Business process changes.

Question 21

Office Automation Systems (OAS) is the most rapidly expanding system. Describe the broad groups of OAS based on the types of its operations.

Answer

Office Automation Systems (OAS) is most rapidly expanding computer based information systems. The broad groups that can be formed based on its operations are as follows:

(i) **Text processing system:** The text processing system automates the process of document capture and/ or creation of new documents such as letters, reports, memo etc. This permits use of standard stored information to produce personalized documents. It reduces effort and minimizes the chances of errors.

(ii) **Electronic Document Management system:** It captures the information contained in documents, stored for future reference and makes them available to the users as and when required. These systems are very helpful in remote access of documents and internal communication through network. It also helps to keep record of resources utilization.

(iii) **Electronic message communication system:** The electronic message communication system helps in receipts and distribution of electronic records. It offers a lot of economy in terms of reduced time in sending or receiving the message; online development and editing; broadcasting and rerouting; and integration with other information system. E-mail, Fax, and voice mail are important OAS.

(iv) **Teleconferencing and Video Conferencing systems:** This OAS helps in receipt and distribution of information involving more than two persons located at two or more different places through audio or video with or without computer system.

Question 22

A business manager should have adequate knowledge to operate Information Systems effectively. Elaborate.

Answer

To operate Information Systems (IS) effectively and efficiently, a business manager should have following knowledge about it.

- **Foundation Concepts –** It includes fundamental business, and managerial concepts e.g. 'what are components of a system and their functions', or 'what competitive strategies are required'.
- **Information Technologies (IT) –** It includes operation, development and management of hardware, software, data management, networks, and other technologies.
- **Business Applications –** It includes major uses of IT in business steps i.e. processes, operations, decision making, and strategic/competitive advantage.
- **Development Processes –** It comprise how end users and IS specialists develop and execute business/IT solutions to problems.
- **Management Challenges –** It includes 'how the function and IT resources are maintained' and utilized to attain top performance and build the business strategies.

Question 23

Modern business used Information Technology to carry out basic functions including systems for sales, advertisement, purchase, management reports etc. Briefly discuss some of the IT tools crucial for business growth.

Answer

Some of the IT tools crucial for business growth are as follows:

- **Business Website –** By having a website, enterprise/business becomes reachable to large number of customers. In addition, it can also be used in an advertisement, which is cost effective and in customer relationship management.
- **Internet and Intranet –** Time and space are no obstacles for conducting meeting of people working in a team from multiple locations, or with different vendors and companies. Intranet is system that permits the electronic exchange of business data within an organization, mostly between managers and senior staff. E-commerce among partners (suppliers, wholesalers, retailers, distributors) using intranets, e-mail etc. provides new platform to the business world for conducting business in a faster and easier way.
- **Software and Packages –** DBMS, data warehousing, data mining tools, knowledge discovery can be used for getting information that plays important role in decision making that can boost the business in the competitive world. ERP is one of the latest high-end solutions that streamlines and integrates operation processes and information flows in the company to synergize major resources of an organization.
- **Business Intelligence –** Business Intelligence (BI) refers to applications and technologies that are used to collect; provide access and analyze data and information about companies' operations. Some BI applications are used to analyze performance or internal operations e.g. EIS (executive information system), business planning, finance and budgeting tools; while others are used to store and analyze data e.g. Data mining,

Data Warehouses, Decision Support System etc. Some BI applications are also used to analyze or manage the human resources e.g. customer relationship and marketing tools.

- **Computer Systems, Scanners, Laptop, Printer, Webcam, Smart Phone etc.-** Webcam, microphone etc. are used in conducting long distance meeting. Use of computer systems, printer, and scanner increases accuracy, reduce processing times, enable decisions to be made more quickly and speed up customer service.

Question 24

Discuss the pre-requisites of an effective MIS.

Answer

The pre-requisites of an effective Management Information Systems (MIS) are as follows:

- ***Database** - It is collection of files, which is collection of records and records are nothing but collection of data. The data in database is organized in such a way that accessing to the data is improved and redundancy is reduced. The main characteristics of database are given as follows:*
  - *It is user-oriented.*
  - *It is capable of being used as a common data source to various users, helps in avoiding duplication of efforts in storage and retrieval of data and information.*
  - *It is available to authorized persons only.*
  - *It is controlled by a separate authority established for the purpose, known as Database Management System (DBMS).*
- ***Qualified System and Management Staff** – The second pre-requisite of effective MIS is that it should be manned by qualified officers. These officers, who are experts in the field, should understand clearly the views of their fellow officers. For this, the organizational management base should comprise of two categories of officers - Systems and Computer Experts and Management experts.*
  - *Systems and Computer experts in addition to their expertise in their subject area/s should also be capable of understanding management concepts to facilitate the understanding of problems faced by the concern. They should also be clear about the process of decision making and information requirements for planning and control functions.*
  - *Management experts should also understand quite clearly the concepts and operations of a computer. This basic knowledge of computers will be useful to place them in a comfortable position, while working with systems technicians in designing or otherwise of the information system.*
- ***Support of Top Management** – The support from top management is required for*

the effectiveness of MIS in an organization. The reasons for the same are as follows:

- ***Any implementation, which does not receive the support of top management will not be effectively controlled and tends to get lesser priority and may be delayed or abandoned.***
- ***The resources involved in computer-based information systems are large and are growing larger in view of importance gained by management information system.***
- ***To gain the support of top management, the officers should place before top management all the supporting facts and state clearly the benefits, which will accrue from it to the concern. This step will certainly enlighten management, and will change their attitude towards MIS. Their wholehearted support and cooperation will help in making MIS an effective one.***

o ***Control and maintenance of MIS - Control of the MIS means the operation of the system as it was designed to operate. Some time, users develop their own procedures or short cut methods to use the system, which reduce its effectiveness. To check such habits of users, the management at each level in the organization should devise checks for the information system control. Maintenance is closely related to control. Formal methods for changing and documenting changes must be provided.***

Question 25

The intuitive character of executive decision making is reflected strongly in the types of information found most useful to executives". Discuss characteristics of the types of information used in executive decision making.

Answer

"The intuitive character of executive decision-making is reflected strongly in the types of information found most useful to executives". The characteristics of the types of information used in executive decision making are as follows:

- ***Lack of structure – Many of the decisions made by executives are relatively unstructured. These types of decisions are not as clear-cut as deciding how to debug a computer program or how to deal with an overdue account balance. Also, it is not always obvious, 'which data are required' or 'how to weigh available data when reaching a decision.'***
- ***High degree of uncertainty – Executives work in a decision space that is often characterized by a lack of precedent. For example, when the Arab oil embargo hit in mid 1970s, no such previous event could be referenced for advice. Executives also work in a decision space where results are not scientifically predictable from***

actions. If prices are lowered, for instance, product demand will not automatically increase.

- *Future orientation – Strategic-planning decisions are made to shape future events. As conditions change, enterprises must change also. It is the executive's responsibility to make sure that the organization keeps pointed toward the future. Some key questions about the future include: "How will future technologies affect what the company is currently doing? What will the competition (or the government) do next? What products will consumers demand five years from now?" As one can see, the answers to these questions about the future external environment are vital.*
- *Informal Source – Executives, more than other types of managers, rely heavily on informal source for key information. For example, lunch with a colleague in another firm might reveal some important competitor strategies. Informal sources such as television might also feature news of momentous concern to the executive – news that he or she would probably never encounter in the company's database or in scheduled computer reports.*
- *Low level of detail – Most important executive decisions are made by observing broad trends. This requires the executive to be more aware of the large overview than the tiny items. Even so, many executives insist that the answers to some questions can only be found by mucking through details.*

Question 26

Briefly explain any four features of Electronic mail.

Answer

Various features of Electronic mail are stated below:

- *Electronic Transmission: The transmission of messages with email is electronic and message delivery is very quick, almost instantaneous. The confirmation of transmission is also quick and the reliability is very high.*
- *Online Development and Editing: The email message can be developed and edited online before transmission. The online development and editing eliminates the need for use of paper in communication and facilitates the storage of messages on magnetic media, thereby reducing the space required to store the messages.*
- *Broadcasting and Rerouting: Email permits sending a message to many target recipients. Thus, it is easy to send a circular to all branches of a bank using Email resulting in a lot of saving of paper. The email could be rerouted to people having direct interest in the message with or without changing or and appending related information to the message.*
- *Integration with other Information Systems: The E-mail has the advantage of being integrated with the other information systems that helps in ensuring that the*

message is accurate and the information required for the message is accessed quickly.

- ***Portability:*** *Email renders the physical location of the recipient and sender irrelevant. The email can be accessed from any Personal Computer/tablet/smart phones equipped with the relevant communication hardware, software and link facilities.*
- ***Economical:*** *Email is one of the most economical modes for sending and receiving messages. Since the speed of transmission is increasing, the time and cost on communication media per page is very less. Thus, email is very helpful not only for formal communication but also for informal communication within the enterprise.*

Question 27

What is meant by the Core Banking System (CBS)? List its elements.

Answer

Core Banking System (CBS) - *Core Banking is a banking services provided by a group of networked bank branches where customers may access their bank account and perform basic transactions from any of the member branch offices. Core Banking System (CBS) may be defined as a back-end system that processes daily banking transactions, and posts updates to accounts and other financial records. These systems typically include deposit, loan and credit-processing capabilities, with interfaces to general ledger systems and reporting tools. Core banking functions differ depending on the specific type of bank. Banks make these services available across multiple channels like ATMs, Internet banking, and branches.*

Elements of core banking include the following:

- *Making and servicing loans.*
- *Opening new accounts.*
- *Processing cash deposits and withdrawals.*
- *Processing payments and cheques.*
- *Calculating interest.*
- *Customer Relationship Management (CRM) activities.*
- *Managing customer accounts.*
- *Establishing criteria for minimum balances, interest rates, number of withdrawals allowed and so on.*
- *Establishing interest rates.*
- *Maintaining records for all the bank's transactions.*

Exercise

1. *What is DSS? Explain the components of a DSS in brief.*
2. *Differentiate between DSS and Traditional MIS.*
3. *"A Decision Support System supports human decision-making process rather than providing a means to replace it". Justify the above statement by stating the characteristics of decision support system.*
4. *"Decision support systems are widely used as part of an Organization's Accounting Information system". Give examples to support this statement.*
5. *Briefly describe five major characteristics of the types of information used in Executive Decision making.*
6. *Write short notes on the following:*
   - *(i) Text Processing Systems*
   - *(ii) Components of Message Communication Systems*
   - *(iii) Teleconferencing and Video-conferencing Systems*
   - *(iv) Role of information in business*
7. *Distinguish between General-purpose planning languages and Special-purpose Planning Languages.*