2 Planning & Decision-Making

Unit - I

SECTION - A
Very Short Answer Questions
(3 Marks Each)

Q1. What do you understand by planning?

Ans. Planning :

It is an attempt to control the development of future events. Planning is the managerial process of deciding in advance, what is to be done, how to do it, and who is to do it. It provides the guidelines necessary for decision-making and resulting action throughout the organisation. It is done on both a formal and informal basis and planning process uses information from internal and external sources. The process gathers, translates, understands and communicates information that will help to improve the quality of current decisions. It starts with a long term mission and includes establishing goals and objectives, translating them into plans for information system development.

Q2. List some important characteristics of Planning?

Ans. The following are the basic characteristics of planning :

1. **It is Cognitive Activity :** Planning is a cognitive activity which mean it is mental work. Every movement in the planning process is more concerned with the mental work and lesser with the physical work.
2. **It is guide to managerial performance :** Plans are internal to help the managers in their routine activities.
3. **It brings out uniformity in action :** Plans are designed to bring uniformity in the managerial performances, practically in multi-locations settings of an organisation.
4. **It provides carefulness to manager :** Plans are guidelines to the manager, therefore, they provide manager to complete their goals and objectives.
5. **It creates and sustains good conduct and behaviour :** Plans are meant for creating and sustain good conduct and behaviour among the employees at different levels in the organisation.

Q3. Write a note on Corporate planning.

Ans. Corporate Planning :

Corporate planning deals with the corporate business goals and objectives. The business may be a manufacturing or a service; it may deal with the industry or trade, may operate in a public or private sector; may be national or international business. Corporate business planning is a necessity in all cases. Though corporate business planning deals with a company its universe is beyond the company. The corporate business plan considers the world trends in the business, the industry, the technology, the international markets, the national priorities, the competitors, the business plans, the corporate strength and weakness for preparing a corporate plan.

Q4. Explain the hierarchy of planning.

Ans. The hierarchy of the plans started worth mission and ends at budget. The hierarchy represented the top to bottom planning order. Each plan has taken up by the respective organisational level. These level of organisations are strategic planning level, tactical planning level, operational planning levels and scheduling and budgetary level. The strategic plan should include business to be in, market it should sell etc. It is to develop such long term objectives for the entire organisations and for its major business units and to specify general strategies for the acquitions of the resources need to accomplish the objectives. It also focused and challenging long term objectives to which all its plans and actions will confirm. Tactical plans are physically implementation of strategic plan operational plans are allocation of costs to each organisation unit in order to achieve objectives of tactical plans scheduling and dispatching plan is specific unit of organisational activity to active the organisational objectives as soon as possible.

Hierarchy of Planning and Levels

Q5. What do you mean by Decision-making?

Ans. Decision making :

Decision making is defined as the process of selecting an optimum and best alternative from a couple of given alternatives to accomplish a particular task. But if only one alternative is available, then a decision can be made. Decision making process is the core of managerial function in MIS. A decision making process involves the entire process of establishing goals, defining activities, searching for alternatives and finally the development of plans. In addition, the decision-making process includes all the activities of problem solving, coordinating, information processing and evaluating the alternatives that usually precedes a decision.

The management needs to take decisions at various steps such as planning, organising, staffing, directing, coordinating and evaluating the alternatives that usually precede a decision.

The information system helps the management to work on these decisions. Therefore, if the management is able to take right decisions, the information system can be suitably designed accordance with those decisions.

The aim of the information system is to provide decision supportive information in the management process that helps achieve the organisational goals in an efficient manner. MIS needs to support the management in taking the decisions, so that the information system can become an aid for the management.

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Q6. Differentiate programmed and non programmed decisions.

Ans.

Programmed decisions	Non-programmed decisions
1. Concerned with relatively routine problems. They are structured and repetitive.	Concerned with unique or unusual problems. They are unstructured, non-repetitive and ill defined.
2. Such decisions are relatively simple and have a small impact.	Such decisions are relatively complex and have a long-term impact.
3. The information related to these problems is readily available and can be processed in a pre-determined manner.	The information related to these problems is not readily available.
4. It takes very little time and effort, as there are pre-determined decision rules and procedures.	They demand a high degree of executive judgement and deliberation.
5. Taken at lower levels of management.	Taken at higher levels in the organization.
6. Eg : personnel habitually coming late in office.	Eg : Expansion of business.

SECTION - B
Short Answer Questions
(7.5 Marks Each)

Q7. What do you understand by planning? List some important characteristics of Planning?

Ans. Planning :

It is an attempt to control the development of future events. Planning is the managerial process of deciding in advance, what is to be done, how to do it, and who is to do it. It provides the guidelines necessary for decision-making and resulting action throughout the organisation. It is done on both a formal and informal basis and planning process uses information from internal and external sources. The process gathers, translates, understands and communicates information that will help to improve the quality of current decisions. It starts with a long term mission and includes establishing goals and objectives, translating them into plans for information system development.

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Q8. What do you mean by corporate planning? Explain its historical development and evolution.

Ans. *Corporate planning is the process of planning the future work of a whole company.* It is also defined as planning the future financial state of a group of companies.

Corporate planning is a systematic approach to clarifying corporate objectives, strategic decision making and checking progress towards objectives. A corporate plan is a set of instructions to managers of an organization describing what role each department is expected to fulfill in the achievement of organization's objectives. Corporate planning provides the way in which a company plans what its business activities will be in the future, including which products it will produce, where it will sell them and how much profit it will try to make.

History : During the 1950s and 1960s, companies were growing in size and complexity. Consequently, executives faced with the challenges of coordinating decisions and maintaining control. Corporate planning was devised as a framework for harmonizing capital investment decisions and the long-term development of the firm. The typical format was a five-year corporate planning document that laid down objectives, forecast key economic trends (e.g., demand, market share, revenue and costs), identified priorities in different business lines and allocated capital expenditure. Diversification into new business areas was a major thrust of corporate planning.

Phases : There are five phases in planning :

1. **Formulating the mess :** In this phase, planners attempt to understand the system of threats and opportunities, the organization faces.
2. **Ends planning :** Here a desirable future for the organization is specified.
3. **Means planning :** In this step, the way to reach the ends is delineated.
4. **Resource planning :** The required resources together with the time in which they will be needed and the way to obtain them are determined in this phase.
5. **Design of implementation and control :** This phase addresses the questions of who is to do what, when and where and how the implementation and results should be monitored.

Transition :

The 1970s saw the birth of a new approach. Failure of diversification efforts, the oil shocks of 1974 and 1979 and increased international competition from Europe, Japan and Asia required a change in management emphasis. The turbulent management environment meant that firms could not "plan" investments, new product introduction and human resource requirements five years ahead because of forecasting, challenges in a changing environment. Hence, there was a shift from "planning" to "strategy making", where the focus was on positioning the firm in relation to competitors in a way that would maximize potential profit.

Orientation :

There are four basic orientations to planning :

1. **Reactive :** Reactivists tend to like the way things were in the past. Faced with a tide of change, they swim against it to restore the past status.
2. **Inactive :** Inactive planners' frame of reference is the present state of affairs.
3. **Preactive :** Preactivists believe the future will be better than the present and the past.
4. **Interactive :** Interactivists are not content with the past, present or the future state of affairs.

Q9. What planning dimensions determine information system development? Elaborate.

Ans. Planning :

Project planning focuses on assessing the information systems needs of the entire organisation. The objective of project planning process is the development of Baseline Project Planning (BPP) and Statement of Work (SOW).

Dimensions of Planning that Determine Information System Development :

- **Determine Project Scope :** Scope defines boundaries of project.

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- **Identify alternative solutions and assess for each feasibility :** Identify general alternative solutions for current problem or opportunity and assess each for feasibility, so that a choice can be made.
- **Identify Tasks :** A work breakdown structure is a hierarchical decomposition of project into phases, activities and tasks. Milestones are events that signify accomplishments.
- **Estimate Task Durations :** We have to estimate minimum duration, maximum duration, and expected duration and then, calculate the most likely duration.
- **Specify Intertask Dependency :** The intertask dependencies are :
  (a). Finish-to-Start,
  (b). Start-to-Start
  (c). Finish-to-Finish,
  (d). Start-to-Finish
- **Assign Resources and Create a Resource Plan:** Different resources for a project are : People, Service, Facilities and Equipments, Supplies and Materials, Money etc.
  Project estimating and deploying human resources is typically the most important resource planning activity, as people are the most expensive elements. The resource plan is used to help assemble and deploy resources in most effective manner.
- **Develop Communication Plan :** Outline the communication procedure among management, project team members and the customer.
- **Determine Project Standard & Procedures :** The team must decide CASE tools, any modification in SDLC phases, documentation styles and terminology.
- **Identifying and Assessing Risk :** Risks might arise from the use of new technology, resistance to change, availability of critical resources or inexperienced team members.

Create Preliminary Budget : Preliminary Budget outlines the planned expenses and revenues associated with project.

Develop SOW : Developed primarily for the customer, SOW (Statement of Work), outlines a description of all work, that will be done and makes clear, what the project will deliver.

Q10. What are the primary differences between operational, tactical and strategic planning.

Ans. Senior management helps in the formulation of long term plans uses ***strategic information.*** **Strategic information** may be used to improve the organization's awareness of its environment and its competitive position. It will not be in a great deal of detail, but will cover a wide range of topics. Because much of strategy making is novel and unstructured, formal information have a limited role especially in the processing of information. Such information includes overall profitability, the profitability of different segments of the business, future market prospectus, the availability and cost of raising new funds, total cash need and capital equipment needs.

Tactical or middle level management is the broadest spectrum of management. Manager at this level face complexity and uncertainty and require judgment, insight and much interpersonal skill to carry out their tasks. Both formal and informal information flows are essential and there is much less reliance on computer dominated systems, although computer based decision support systems can provide valuable assistance.

Operational management *is concerned with the implementation and control of the - today activities of the organization. Their activities are highly dependent on formal MIS dealing almost exclusively with*

internal information. In the payroll office for example, operational information relating today rate labour will include hour worked each week by each employee, his rate of pay per hour, detail of his deductions, and for the purpose of wages, analysis details of the time each man spent on individual job during the weak.

Characteristics	Strategic Level	Tactical level	Operational level
Source	Largely External	Internet and External	Largely Internal
Scope	Very wide	Intermediate	Narrow and well defined
Level of detail	Board and aggregated	Aggregated to some extent	Detail
Currency	Historical and forecast	Recent	Very recent
Timeliness	Not urgent	Fairly up - to - date	urgent and up - to - date
Frequency of use	Infrequent	Regular (monthly/weekly)	Frequently (daily/hourly)
Required Accuracy			

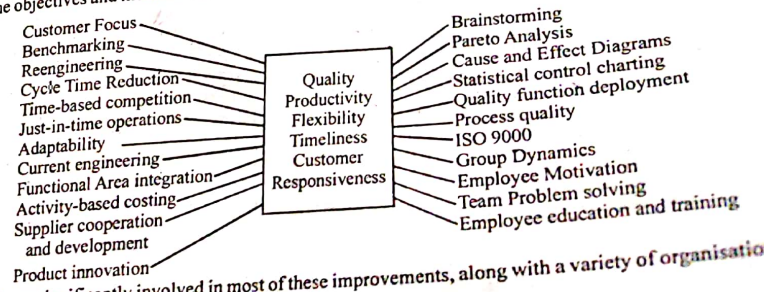
Q11. Explain how MIS is helpful in improving the quality of decision-making.

Ans. MIS is helpful in improving the quality of decision making because now-a-day's in every field of human working, right information is considered as the most importance resource of good decision making. Every organisation runs by the managers of organisation, who are making decisions in every step of organisational activities. Due to the importance of the information in decision making, a separate field has emerged to serve the appropriate information's to managers for effective and quality of good decision making purpose. Serving the suitable information used to pass through a process called management information system as the information is using to make the quality and other management of decisions.

The main purpose of MIS is to ensure the flow of appropriate information to the appropriate people of organisation as well as parties related with organisation. So that they can make good decision for running the organisation. The entire process objective is to provide complete, timely, reliable and quality information to the decision makers.

Thus, management information system can be used strategically to improve business performance in many ways other than in supporting reengineering initiatives. One important strategic thrust in continuous quality improvement, popularly called TQM i.e. Total Quality Management. Previous to TQM, quality was defined as meeting established standards or specifications for a product or service. Statistical quality control programs were used to measure and correct any deviations from standards.

The objectives and methodologies of total quality management



MIS was significantly involved in most of these improvements, along with a variety of organisatio management, and work redesign initiatives.

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Q12. Compare between management control and operational control.

Ans. There are some blurred edges along the line dividing management control from operational control. There are specific differences distinguishing these two classes of decision making.

1. Operational Control relates to individual task in stock control for example, the EOQ might be applied to divide the economic level of stockholding for each individual item among the many items stocked by the company. This would be an application of operational control. In contrast, Management control is concerned with the sum effect of the individual task.
   So, in our example, management control would be concerned with the total size of investment in stocks, the speed of stock turnover, and how the actual investment and turnover compared with budget.
2. Operational Control is applied according to a specified 'Scientific' rules where a management control relies more heavily on subjective, judgements and uncertainties. An important argument put forward by scientific management and operational research (mathematical) models are more readily applied to operational control than to management control.
3. The information provided for management control (tactical information) in usually a summary, expressed in financial terms, of many individual operating operational control information is about the details of each individual task for example each job card prepared in a production department as a job progresses from start to completion, and each job cost card preferred in the cost office are examples of operational control information. The sum of all job cards and job cost-cards would provide management control information.
4. Many operational centre of decisions can be automated or programmed. Programmed control exists when the relationship between inputs and outputs is clearly defined, so that an optional relationship can be specified for every activity. Mathematical Models can be designed to provide optional solutions to problems and many physical procedures can be controlled by automatic devices. Programmed control will always be a form of operational control. In contrast, Management Control relying on judgment, qualitative as well as quantitative factors, is always 'non-programmed' cost which are controlled by managers judgement rather than automated procedure are known as managed costs.

Q13. Differentiate programmed and non programmed decisions. What is the use of MIS in both the types?

Ans.

S.No.	Programmed decisions	Non-programmed decisions
1.	Concerned with relatively routine problems. They are structured and repetitive.	Concerned with unique or unusual problems. They are unstructured, non-repetitive and ill defined.
2.	Such decisions are relatively simple and have a small impact.	Such decisions are relatively complex and have a long-term impact.
3.	The information related to these problems is readily available and can be processed in a pre-determined manner.	The information related to these problems is not readily available.
4.	It takes very little time and effort, as there are pre-determined decision rules and procedures.	They demand a high degree of executive judgement and deliberation.
5.	Taken at lower levels of management.	Taken at higher levels in the organization.
6.	E.g : personnel habitually coming late in office.	Eg : Expansion of business.

Use of MIS in programmed and Non-programmed decisions :

The MIS and its organizational subsystems contribute to decision making process in many basic ways. Nowadays, organizations use MIS to assist managers for decision making. Organization often make decisions regarding operational improvements or selecting new business opportunities for maximizing the company's profit. Companies develop a decision-making process based on individuals responsible for making decisions and the scope of the company's business operations. MIS is a useful tool for making business decisions. Historically, the MIS was a manual process used to gather information and funnel it to individuals responsible for making decisions.

The concept of programmed decision making is the finest tool available to the MIS designer, whereby he can transfer decision making from a decision maker to the MIS and still retain the responsibility and accountability with the decision maker or the manager. In case of non-programmed decisions, the MIS should provide the DSSs to handle the variability in the decision making conditions.

SECTION - C
Long Answer Questions
(15 Marks Each)

Q14. Write a detail note on Corporate and Strategic planning.

Ans. Corporate Planning :

Corporate planning deals with the corporate business goals and objectives. The business may be a manufacturing or a service; it may deal with the industry or trade, may operate in a public or private sector; may be national or international business. Corporate business planning is a necessity in all cases. Though corporate business planning deals with a company its universe is beyond the company. The corporate business plan considers the world trends in the business, the industry, the technology, the international markets, the national priorities, the competitors, the business plans, the corporate strength and weakness for preparing a corporate plan.

Dimensions of Planning : The corporate business plan has five dimensions. These are time, entity, organisation, elements and characteristics.

1. **Time :** The plan may be either long range or short range but the execution of the plan is, year after year. The plan is made on a rolling basis where every year it is extended by one year.
2. **Entity :** The plan entity is the thing on which plan is focused.
3. **Organisation :** The corporate plan would deal with the company as a whole, but it has to be broken down for its subsidiaries.
4. **Elements :** The plan is made out of several elements. The plan begins with the mission and goal which organisation would like to achieve.
5. **Characteristics :** There are no definite characteristics of a corporate plan. The choice of characteristics is a matter of convenience helping to communicate to everybody concerned in the organisation and for an easy understanding in execution.

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Strategic Planning :

The strategic plan would deal with the company as a whole, but it has to be broken down for its subsidiaries plan. The strategic plan therefore, would be master plan and it would comprise several subsidiary plans. There are some compelling reasons which force all the organisations to resort to strategic business planning. The following reasons make planning as essential management process to keep the business in a good shape and condition :

1. Market forces
2. Technological change
3. Complex diversity of business
4. Competition.
5. Environment.

Planning for information system development must be done within the framework of the organisation's overall MIS plan. **It may be viewed from two dimensions:**

1. Time horizon dimension specifies, whether it is short range, medium term or long range.
2. The focus dimension lets whether the primary concern is strategic, managerial or operational.

Strategic MIS planning is an orderly approach that determines the basic objectives for the user to achieve and the tactical plans to implement the strategies. The first task in strategic planning is to set the MIS objective and the result expected. Once, the objectives are set, MIS policies are defined as a guideline to be used in carrying out strategy. MIS policies are translated into long-range (conceptual), medium range (managerial), and short range (operational) plan for implementation.

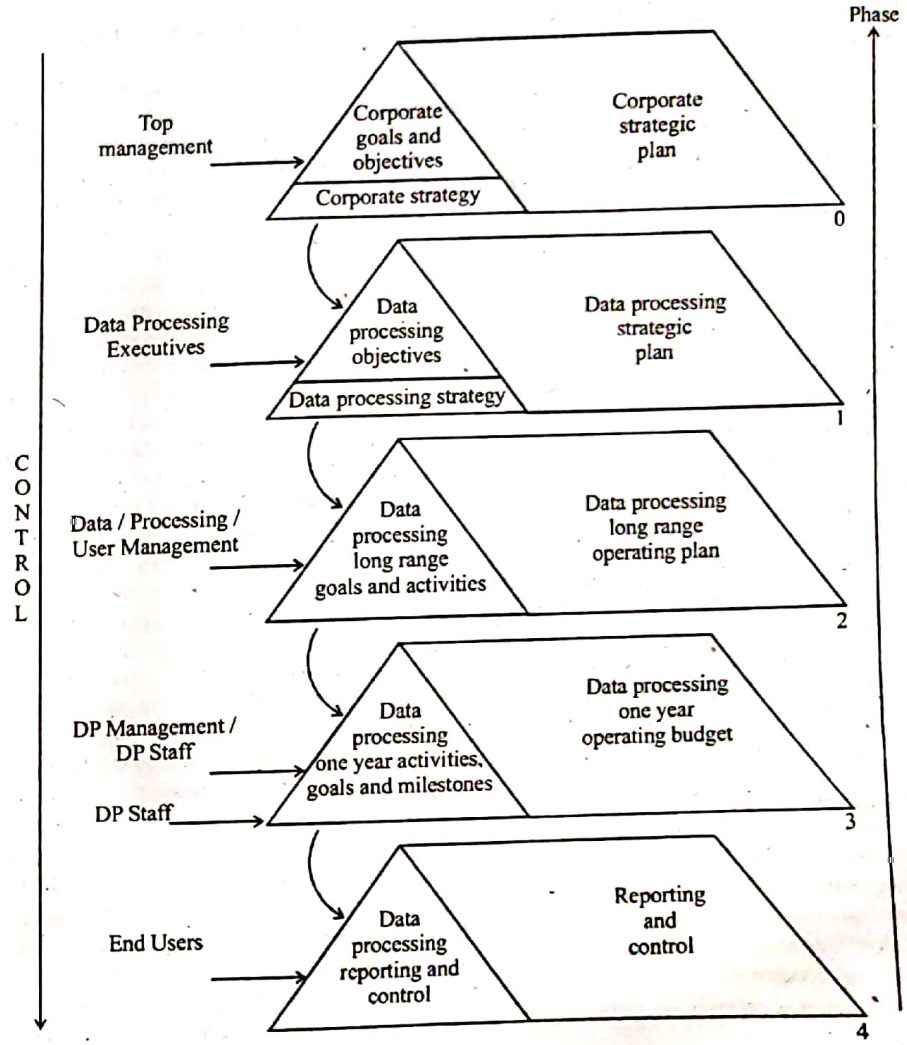
Q15. Explain top-down approach to system planning.

Ans. Top-Down Approach to System Planning :

Planning is the most important and initial activity of any development process carried out in an organisation. Planning is done at all levels of management of the organisation, because every level participates in the system development process. And since, the projects are finally approved by the top management therefore, top-down approach is followed for system planning. Planning starts from the top-level management for long range plans, to medium-level management for medium-range and then, finally to lower-level management for short range plans.

Planning for system development activities is a major aspect of the overall planning job, in terms of its importance and commitment and planning resources. Broad corporate strategic objectives should be the basis for system development objectives, which dictate operating goals in the form of specific action plans. Formalising the planning process makes it easier to reorient and gain the support of upper, middle and operating management for candidate system.

Top-Down approach to system planning and the relationship between corporate strategic plan and the goals and activities of the system development function is diagrammatically described below :



Q16. What is Strategic Planning? When does it assume importance in business and how it is linked to goals of the company? Explain how MIS is related to strategic planning

Ans. Strategic Planning :

A strategy is an overall approach and plan. So, strategic planning is the overall planning that facilitates the good management of a process. The focus of a strategic plan is usually on the entire organization. The way that a strategic plan is developed depends on the nature of the organizations leadership, culture of the organization, complexity of the organization's environment, size of the organization, expertise of planners etc.

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Strategic planning is an organization's process of defining its strategy, or direction, and making decisions on allocating its resources to pursue this strategy, including its capital and people. Various business analysis techniques can be used in strategic planning, including SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats), PEST analyses (Political, Economic, Social and Technological), SCERF analysis (Socio-cultural, Ecological and Regulatory Factors).

Strategic planning is the formal consideration of an organization's future course. All strategic planning deals with at least one of three key questions :

1. What do we do ?
2. For whom we do it ?
3. How do we excel ?

It is also true that strategic planning may be a tool for effectively plotting the direction of a company.

Strategic planning is a very important business activity. It is also important in the public sector areas such as education. It is practiced widely informally and formally. Strategic planning and decision process should end with objectives and a roadmap of ways to active them.

One of the core goals when drafting a strategic plan is to develop it in a way that is easily translatable into action plans.

The following terms have been used in strategic planning : desired end states, plans, policies, goals, objectives, strategies, tactics and actions. The most common of these concepts are specific, time bound statements of intended future results and general and continuing statements of intended future results, which most models refer to as either goals or objectives.

The following reasons make strategic planning important so as to keep the business in good shape and condition :

(i) Market forces.
(ii) Technological changes.
(iii) Complex diversity of business.
(iv) Competition.
(v) Environmental threats, challenges.

Strategic Planning Linked to the Goals of Company :

Strategic planning deals with the development of an organization's mission, goals, objectives, strategies and policies. Like any other business activity, planning also has a process and methodology. In the very beginning of the planning process, it is necessary to establish and communicate to all concerned, the social and economic responsibilities of the organization i.e., to decide the goal of the organization. The aim of an organization is a broad statement of the organization's existence which sets the direction of the organization and decides the scope and boundaries of the business. The task after deciding the mission is to set the goals of the organization.

The goal is more specific and has a time scale of three to five years. The next task is to set various objectives. The objectives are described in terms of business results to be achieved in a short duration of a year or two. The success in achieving the goal and objectives is directly dependent on the management's business strategies. The strategy means the manner in which resources will be put to use over a period to achieve the goals. After the strategies are formulated, the policies are set. Policies are the general guidelines that direct the decision making of an organization.

MIS : Strategic Planning :

Business environment is prone to changes and this factor makes business planning very complex. Some factors such as the market forces, technological changes, complex diversity of business and competition have a significant impact on any business prospects. MIS is designed to assess and monitor these factors. The MIS design is supposed to provide some insight into these factors enabling the management to evolve some strategy to deal with them. Since these factors are a part of the environment; MIS design is required to keep a watch on environment factors and provide information to the management for a strategy formulation.

Strategy formulation is a complex task based on the strength and weakness of the organization and the mission and goals it wishes to achieve. Strategy

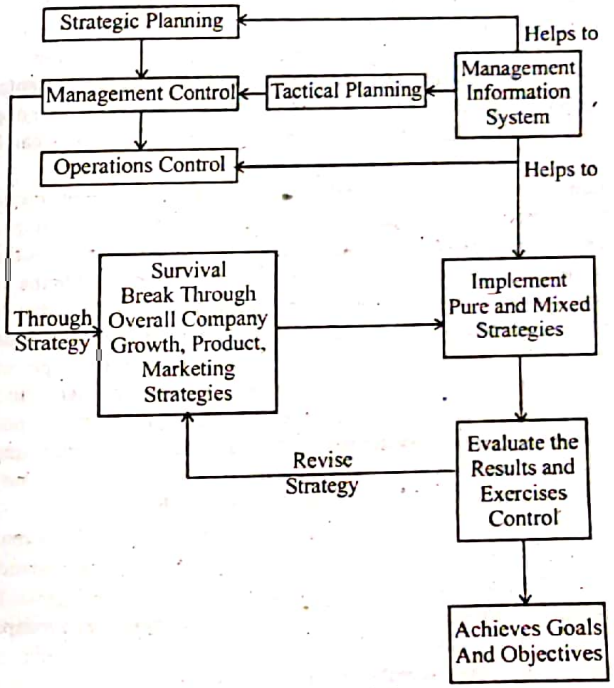
formulation is the responsibility of the top management and the top management relies on the MIS for information.

There are various business strategies such as overall company growth, product, market, financing and so on. MIS should provide the relevant information that would help the management in deciding the type of strategies the business needs. Every business may not require all the strategies all the time. The type of strategy is directly related to the current status of business and the goals it wishes to achieve. The MIS is supposed to provide current information on the status of the business vis-à-vis the goals. If business is losing in a particular market segment, then the strategy should be a market or a product strategy.

The MIS is supposed to evaluate the strategies in terms of the impact they have on business and provide an optimum mix.

The figure given below explains the role of the MIS in strategic planning and its support in the execution and control of the management processes.

Management Information Systems and Planning and Control Process in the Organization :



MIS and Strategic Management Process

Q17. What are the three different categories of strategic information systems ? Explain each of them in detail.

Ans. Strategic Information Systems :

Strategic systems are information systems that are developed in response to corporate business initiative. They are intended to give competitive advantage to the organization. They may deliver a product or service that is at a lower cost, that is differentiated, that focuses on a particular market segment, or is

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innovative.

They are those systems where information services resources are applied to strategic business opportunities in such a way that the computer systems have an impact on the organization's products and business operations. Strategic information systems are always systems that are developed in response to corporate business initiative. The ideas in several well-known cases came from information Services people, but they were directed at specific corporate business thrusts. In other cases, the ideas came from business operational people, and Information Services supplied the technological capabilities to realize profitable results. The three general types of information systems that are developed and in general use are financial systems, operational systems, and strategic systems. These categories are not mutually exclusive and, in fact, they always overlap to some. Well-directed financial systems and operational systems may well become the strategic systems for a particular organization.

Financial systems are the basic computerization of the accounting, budgeting, and finance operations of an organization. These are similar and ubiquitous in all organizations because the computer has proven to be ideal for the mechanization and control or financial systems; these include the personnel systems because the headcount control and payroll of a company is of prime financial concern. Financial systems should be one of the bases of all other systems because they give a common, controlled measurement of all operations and projects, and can supply trusted numbers for indicating departmental or project success. Organizational planning must be tied to financial analysis. There is always a greater opportunity to develop strategic systems when the financial systems are in place, and required figures can be readily retrieved from them.

Operational systems, or services systems, help control the details of the business. Such systems will vary with each type of enterprise. They are the computer systems that operational managers need to help run the business on a routing basis. They may be useful but mundane systems that simply keep track of inventory, for example, and print out reorder points and cost allocations. On the other hand, they may have a strategic perspective built into them, and may handle inventory in a way that dramatically impacts profitability. A prime example of this is the American Hospital Supply inventory control system installed on customer premises. Where the great majority of inventory control systems simply smooth the operations and give adequate cost control, this well-known hospital system broke through with a new version of the use of an operational system for competitive advantage. The great majority of operational systems for which many large and small computer systems have been purchased, however, simply help to manage and automate the business. They are important and necessary, but can only be put into the "strategic" category it they have a pronounced impact on the profitability of the business.

Strategic systems are those that link business and computer strategies. They may be systems where a new business thrust has been envisioned and its advantages can be best realized through the use of information technology. They may be systems where new computer technology has been made available on the market, and planners with an entrepreneurial spirit perceive how the new capabilities can quickly gain competitive advantage. They may be systems where operational management people and Information Services people have brainstormed together over business problems, and have realized that a new competitive thrust is possible when computer methods are applied in a new way.

Q18. Discuss MIS structure as a synthesis of functions of support for decision-making.

Ans. It is necessary to understand the concepts of decision-making as they are relevant to the design of the MIS. The simon model provides a conceptual design of the MIS and decision-making, wherein the designer has to design the system in such a way that the problem is identified in precise terms. That means the data gathered for data analysis should be such that it provides diagnostics and also provides a path to bring the problem to surface.

In the design phase of the model, the designer is to ensure that the system provides models for decision making. These models should provide for the generation of decision alternatives, test them and pave way for the selection of one of them. In a choice phase, the designer must help to select the criteria to select one alternative amongst the many.

The concept of programmed decision making is the finest tool available to the MIS designer, whereby he can transfer decision-making from a decision maker to the MIS and still retain the responsibility and accountability with the decision maker or the manager. In case of non-programmed decisions, the MIS should provide the decision support system to handle the variability in the decision-making conditions. The decision support systems provide a generalized model of decision making.

The methods of decision-making can be used directly in the MIS provided the method to be applied has been decided. A number of decision making problems call for optimization, and OR models are available which can be made a part of the system. The optimization models are static and dynamic, and both can be used in the MIS. Some of the problems call for a competitive analysis, such as payoff analysis. In these problems, the MIS can provide the analysis based on the gains, the regrets and the utility.

The concept of decision-making systems, such as the closed and the open systems, helps the designer in providing a design flexibility. The closed systems are deterministic and rule based; Therefore, the design needs to have limited flexibility, while in an open system, the design should be flexible to cope up with the changes required from time to time.

The concept of the organizational and behavioural aspects of decision-making provide an insight to the designer to handle the organizational culture and constraints in the MIS. The concepts of the rationality of a business decision, the risk averseness of the managers and the tendency to avoid an uncertainty, makes the designer conscious about the human limitations, and prompts him to provide a support in the MIS to handle these limitations. The reliance on organizational learning, makes the designer aware of the MIS and make him provide the channels in the MIS to make the learning process more efficient. The relevance of the decision-making concepts is significant in the MIS design. The significance arises out of the complexity of decision-making, the human factors in the decision making, the organizational and behaviour aspects, and the uncertain environments. The MIS design addressing these significant factors turns out to be the best design.

Q19. What methods are used in planning information system for business? Explain the forces of these approaches.

Ans. To assist managers and executives in developing, information systems that help achieve an organization's corporate mission, formal planning methods have been developed and made commercially available.

The purpose of these planning methods is to describe an organization wide direction for a firm's information system. This include identifying key elements on which applications depend and are built. It may also include describing the interrelation of these elements and possible documenting the current status of organization's information needs or outlining future plans.

Three approaches are used in planning information system.

1. IBM's Business System Planning (BSP) method.
2. Nolan, Norton and Co's computer architecture strategic planning method.
3. Critical success factors method.

1. IBM's BSP approach, Which is among the most widely used planning methods focuses on identification of the data necessary to run an organization.

2. Nolan, Norton and Co's computer architecture strategic planning method links an organization's current capabilities with its future needs. This method emphasizes development of a strong technic

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infrastructure, or foundation to support the application.

3. Critical success factor method seeks to identify areas that are key to an organization's survival and ensure that these elements are incorporated into the organization's information system.

Among the not widely used methods for developing a stable framework to support an organization's business processes is Business System Planning (BSP) which was originally developed by IBM and later offered as a generalized planning methodology.

Under the BSP approach, data are seen as a valuable corporate resource, a justifiable view in business invest. In capturing, storing and preserving data. The objective of BSP is to identify the data essential to operate a business in today's information based economy.

The BSP is the effective method for describing what is gathering data about an organization and its system as they currently exist.

The factors which forces for these approaches are:

Information system planning requires a vision : A view of the impact that information systems have on an organization's long term corporate success strategically and operationally. An organization's corporate mission should be reflected throughout the preparation and evaluation of its information system project request.

A vision is not just a plan rather, it describes a direction for an organization and a conceptualization of the impact an information system have.

Apart from vision, it must also be communicated, if the organization's personnel and other resources are to be successfully mobilized to build and maintain a viable information system.

The sources of information project requests vary, with project proposals originating with departmental managers, senior executives and system analyses. Sometimes an outside source such as a government agency, stipulates a systems requirement the organization must meet.

Since, the users may submit many project request, organization must have ways of evaluating proposals and selecting the best for development. The project requests which describe the organization system involved and the reasons, the development projects are wanted are reviewed by the selection committee. In evaluating each application, the committee must also be mindful of integrating all applications in the portfolio. Horizontally, vertically, physically and on the basis of external to internal data flow.

Q20. Explain different role of Management Information System in decision making process.

Ans. Role of MIS in decision making process:

The effectiveness of management information systems (MIS) depends upon their impact on the quality of managerial decision making. A Management Information System is a system that has important tools to support, analyze, delivery and adding reliability to any organization. Also this helps to solve business problems. The term MIS is often used to submit to a group of information management, methods tied to the support of human decision making, e.g. Decision Support Systems, Expert systems and Executive information systems.

Decision making is an essence of management. In other words, whatever a manager does, he/she does it through decision making and MIS assists every manager in providing the required information, which is a vital and necessary input in decision making. Decision making is a process of selecting one optimum alternative from various alternatives. Thus, decision is the end result of the decision making process. Thus, the success of decision making, which is the heart of administration process, is highly dependent partly on available information and partly on the functions that are the components of the process.

For example : If managerial objectives are absent or unclear, probably due to inadequate information,

there is no basis for the search. Without information obtained through a search, there are no alternatives to compare and without a comparison of alternatives, the choice of a particular course of action is unlikely to yield the desired result.

Management Information Systems combine hardware, software and network products in an integrated solution that provides managers with data in a format suitable for analysis, monitoring, decision-making and reporting. The system collects data, stores it in a database and makes it available to users over a secure network. ***Various roles of MIS subject to decision making process are as follows :***

1. Information Access : Managers need rapid access to information to make decisions about strategic, financial, marketing and operational issues. Companies collect vast amounts of information including customer records, sales data, market research, financial records, manufacturing and inventory data and human resource records. However, much of that information is held in separate departmental databases, making it difficult for decision makers to access data quickly. A Management Information System simplifies and speeds up information retrieval by storing data in a central location that is accessible via a network. The result is decisions that are quicker and more accurate.

2. Data Collection : Management Information Systems bring together data from inside and outside the organization. By setting up a network that links a central database to retail outlets, distributors and members of a supply chain, companies can collect sales and production data daily, or more frequently and make decisions based on the latest information.

3. Collaboration : In situations, where decision-making involves groups, as well as individuals, Management Information Systems make it easy for teams to make collaborative decisions. In a project team, for example, Management Information Systems enable all members to access the same essential data, even if they are working in different locations.

4. Interpretation : Management Information Systems help decision-makers understand the implications of their decisions. The systems collate raw data into reports in a format that enables decision-makers to quickly identify patterns and trends that would not have been obvious in the raw data. Decision-makers can also use Management Information Systems to understand the potential effect of change. A sales manager, for example, can make predictions about the effect of a price change on sales by running simulations within the system and asking a number of "what if the price was" questions.

5. Presentation : The reporting tools within Management Information Systems enable decision-makers to tailor reports to the information needs of other parties. If a decision requires approval by a senior executive, the decision-maker can create a brief executive summary for review. If managers want to share the detailed findings of a report with colleagues, they can create full reports and provide different levels of supplementary data.

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Unit - III

3 Information & System

SECTION - A
Very Short Answer Questions
(3 Marks Each)

Q1. Discuss the Concept of Information.

Ans. Information can be defined as the data, which can be organised and presented so that the decision maker may take the necessary action. In other words, information is the result / product of processing data. The conversion process is given as :

Data → Process → Information → Decision → Action

Information is a vital resource in development activities of any society. All our economic and social progress depends significantly on the transfer of Commercial, Scientific and Technical Information. People in different situations require Information on a subject in different forms and ends with different emphasis. Thus, Information is a critical resource in the operation and management of Organisations.

An Information System in an Organisation is like a nervous system in human body. It is the link that connects all the organisation's components together and provides for better operation and survival in a Competitive environment. Indeed today's Organisation run on information and information is obtained through processing of Data.

According to **Davis & Olson,** ***"Information is defined as data that has processed into a form that is meaningful to the recipient and is of real or perceived value in current or prospective actions or decisions".***

Q2. What do you understand by system? How is it applicable in MIS ?

Ans. System :

1. A set of detailed methods, procedures, and routines established or formulated to carry out a specific activity, perform a duty, or solve a problem.
2. An organized, purposeful structure regarded as a whole and consisting of interrelated and interdependent elements (components, entities, factors, members, parts etc.). These elements continually influence one another (directly or indirectly) to maintain their activity and the existence of the system, in order to achieve the goal of the system.

Computer-based or manual system that transforms data into information useful in the support of decision making. ***MIS can be classified as performing three functions:***

(1) To generate reports-for example, financial statements, inventory status reports, or performance reports needed for routine or non-routine purposes.

(2) To answer what-if questions asked by management. For example, questions such as "What would happen to cash flow if the company changes its credit term for its customers?" can be answered by MIS. This type of MIS can be called simulation.

(3) To support decision making. This type of MIS is appropriately called Decision Support System (DSS). DSS attempts to integrate the decision maker, the database, and the quantitative models being used.

Q3. What is Systems Analysis?

Ans. Systems Analysis :

Systems analysis is the study of sets of interacting entities, including computer systems analysis. This field is closely related to requirements analysis or operations research. It is also "an explicit formal inquiry carried out to help someone (referred to as the decision maker) identify a better course of action and make a better decision than he might otherwise have made."

The terms analysis and synthesis come from **Greek** where they mean respectively "to take apart" and "to put together". These terms are used in scientific disciplines from mathematics and logic to economics and psychology to denote similar investigative procedures. Analysis is defined as the procedure by which we break down an intellectual or substantial whole into parts. Synthesis is defined as the procedure by which we combine separate elements or components in order to form a coherent whole. Systems analysis researchers apply methodology to the analysis of systems involved to form an overall picture.

System Analysis is used in every field where there is a work of developing something. Analysis can also be defined as a series of components that perform organic function together. —in computer world, in this stage a statement of the problem is formulated and a model is build by the analyst in encouraging real-world situation. This phase show the important properties associated with the situation. Actually, the analysis model is a concise, precise abstraction and agreement on how the desired system must be developed. The objective is to provide a model that can be understood and criticized by any application experts in the area whether the expert is a programmer or not.

Q4. What do you understand by system design?

Ans. System Design : System Design is the most creative and challenging phase of the system life cycle. It describes the final system and the process by which it is developed. The input to this phase are functional specifications of the system and details about the computer configuration. This phase begin from the objectives of the system i.e. information requirement of users.

System design is a solution, a 'how to' approach to the creation of a new system. It provides the understanding and procedural details necessary for implementing the system recommended in the feasibility study. The emphasis is on translating the performance requirements into design specifications.

System analysis describes what a system should do to meet the information needs of users *while,* System designs specifies how the system will accomplish this objective. System design consists of design activities that produce system specification satisfying the functional requirement developed in the systems analysis stage.

SECTION - B
Short Answer Questions
(7.5 Marks Each)

Q5. What characteristics would make Information products valuable and useful to us?

Ans. The characteristics of information products should be determined by examining the attributes of Information Quality. Information that is outdated, inaccurate or hard to understand would not be very meaningful, useful or valuable to us or other end user. People want information of high quality that is information products, whose characteristics, attributes or qualities help to make it valuable to them. It is

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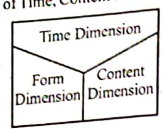
useful to think of Information as having the three dimensions of Time, Content and Form.



Time Dimension :

1. **Timeliness :** Information should be provided when it is needed.
2. **Current :** Information should be upto date when it is provided.
3. **Frequency :** Information should be provided as often as needed.
4. **Time period :** Information can be provided about past, present and future time periods.

Content Dimension :

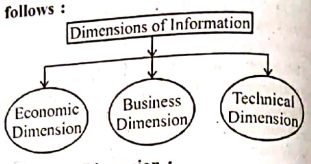
1. **Accuracy :** Information should be free from errors.
2. **Relevance :** Information should be related to the information needs of a specific recipient for a specified situation.
3. **Completeness :** All the Information that is needed should be provided.
4. **Conciseness :** Only the Information that is needed should be provided.
5. **Scope :** Information that have a broad or narrow scope or an internal or external focus.
6. **Performance :** Information can reveal performance by measuring activities accomplished, progress made or resources accumulated.

Form Dimension :

1. ***Clarity :*** *Information should be provided in a form that is easy to understand.*
2. ***Detail :*** *Information should be provided in detail or summary form.*
3. ***Order :*** *Information can be arranged in a predetermined sequence.*
4. ***Presentation :*** *Information can be presented in narrative, numeric, graphic or other forms.*
5. ***Media :*** *Information can be provided in the form of printed paper, document, video display or other media.*

Q6. Discuss the various Dimension of Information.

Ans. The various dimension of Information are as follows :



1. Economic Dimension :

The Economic dimension of Information determines the cost involved in obtaining the information and the benefits that are derived from it. Based on the cost and benefit analysis of the information, the economic dimensions of the information are evaluated. ***The following are the factors that are determined during the cost and benefit analysis :***

(a). Cost of Information
(b). Value of Information

(a). Cost of Information :

The cost of information determines the total cost involved in obtaining the information. ***It includes :***

(i) Cost of acquiring data from the different data sources.
(ii) Cost of maintaining the data in the database.
(iii) Cost of generating the accurate Information from the data stored in the database.
(iv) Cost of communicating the Information to the intended receiver.

(b). Value of Information :

It is determined on the basis of the benefits that can be derived from the Information, **For Example,** A Company develops two products X and Y and the benefits derived from product X equal 20 and the benefits derived from product Y equals 30. The difference between the benefits of two product is 10 units. If we add some information, the benefit derived from product X increases 20 to 40 and the cost of information increases by 20 units. However, the difference between the benefit of product X and Y is again 10 units with the additional cost of 20 units for the cost of information. The actual value of information can be calculated through simple

Mathematics. The cost involved in obtaining the Information should be subtracted to determine the actual value of the Information.

2. Business Dimension :

The Business dimension of the Information helps to determine the relevance of the Information at various levels of the Management. The Business dimension of Information at the top level Management is totally different from the Business dimension of Information at the lower level of Management. The difference in business dimension arises from the difference in the level and nature of work performed at various levels of Management. Thus, the Information needs of Managers at Strategic planning level are altogether different than those of operational control Management. It is because of the fact that Managers at different levels are required to perform different functions in an Organisation.

3. Technical Dimension :

This dimension of Information refers to the technical aspects of the database. Various aspects of database which are considered under this dimension includes the capacity of database, response time, security, validity, data inter-relationship etc.

Q7. What are the sources of information used in evaluating hardware and software?

Ans. The sources of information used in evaluating hardware & software are :

1. Benchmarks.
2. Experience of other users.
3. Read product reference manuals.

1. Benchmark : A benchmark is a sample program used for evaluating different computers and their software. This is necessary because computers often will not use the same instructions, words of memory, or machine cycle to solve a problem. ***In the context of software selection, benchmarking may include the following :***

(a). A determination of the minimum hardware configuration needed to operate a package. A package may be extremely sensitive to its hardware or have considerable flexibility.
(b). An acceptance test as specified in the contract.
(c). Testing in an ideal environment to determine comparative timings and in a normal environment, to determine its influence on other programs.

The more elaborate the benchmarking, the more costly is the evaluation. The user's goals must be kept in perspective. Time constraints also limit how through the testing process can be. There must be a compromise on how much to test, while still ensuring that the software or hardware meets its functional criteria.

2. Experience of Other Users : Since benchmarks only validate the vendor's claims, other sources of information are necessary. The experience of other users with the same system, software, or service is important. Vendors are generally willing to provide a list of "reference accounts" or people with whom to check. Experience shows that the users on such a list happen to be satisfied customers and, therefore, are not typical users. Seeking objective users on one's own can be frustrating, however, even if the "ideal" user is located, the information is useful only, if the user had the same hardware configuration, applications, and software.

3. Read Product Reference Manuals : An important step in the evaluation process is to read product reference manuals that evaluate system capabilities. Since such a search is often laborious, one alternative is to contact organizations that publish reports based on ongoing research and system testing in various sites. **For Example,** Auerbach, Inc. (Philadelphia), publishes loose leaf references on information processing, telecommunications, and computer graphics. The reports elaborate on computer products, services, and prices. Considering the benefits offered, the cost is relatively low.

Q8. Comment on the Quality of Information.

Ans. Quality of Information refers to its fitness for use, or its reliability. ***Some of the attributes of***

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information, which influence the quality of information are as follows :

1. Timeliness : Timeliness means that information must reach to the recipients within the prescribed time frame. For effective decision-making, information must reach the decision maker at the right time, ie. recipients must get information when they need it. Delays of whatever nature, destroy the value of information.

Timely information can ensure corrective executive action at an early stage, thus the expected losses could be eliminated / minimised and gains are maximized by proper management of operations. **For Example,** the report which is required by an executive on the 6th of the every month if presented later, is considered of doubtful value and decisions taken on its basis would not be effective as might have been otherwise.

The characteristic of timeliness, to be effective, should also include up-to-date i.e. current information. In other words, timely information does not mean in time information only, rather it means timely as well as up-to-date information.

2. Accuracy : Accuracy is another key attribute of Management Information. **As per John G Burch and Gary Gurdnitski (1986),** "Accuracy means more than just one plus one equals two." It means that Information is free from mistakes and errors, is clear and accurately reflect the meaning of data on which it is based. Accuracy also means that Information is free from bias. As Manager's decisions are based on the Information supplied in MIS Reports, all Managers need accurate information, the confidence of the Managers will be strengthened and as a result, system implementation will be a success.

3. Relevance : *Relevance is another key attribute of Information. Information is said to be relevant if it answers specifically for the recipient what, where, when, who and why? In other words, the MIS should serve reports to managers which are useful and the information helps them to make decisions. However, what is relevant information for one recipient is not necessarily relevant for another.*

4. Adequacy : *Adequacy means information must* be sufficient in quantity ie. MIS must provide reports containing information which is required in the deciding process of decision making. Adequacy is vital attribute of information which underscores that a report should cover all related aspects about particular event or situation which the report is reporting.

5. Completeness : The information which is provided to manager must be complete and should meet all needs. Incomplete information may result in wrong decisions and thus, may prove costly to the Organisation.

6. Explicitness : A report is said to be of good quality if it does not require further analysis by the recipient for decision making. On the other hand, a poor quality report requires further analysis or processing of its contents. Therefore, explicitness is a prominent attribute of management information procured through the MIS of an organisation. Thus, the reports should be such that a manager does not waste any time on the processing of the report, he should be able to extract the required information directly.

7. Exception Based : Exception reporting principle states that only those items of information which will be of particular interest to a manager are reported. This approach results in saving previous precious time of the Top Management and enable the Managers to devote more time in pursuit of alternatives for the growth of the organisation. If reports do not follow the exemption reporting principle, these will provide even those details which are not required by managers and thus a lot of their time would be wasted in shifting useful Information and as a result, they will not be able to spend much time on other important attributes of the organisation.

Q9. How quality of information improves the knowledge and decision making capability of the people?

Ans. Quality of Information Improves the Knowledge and Decision Making Capability :

Information is a product of data processing. The manager will determine the quality of information based on the degree of motivation it provides for action, and the contribution it provides for effective

decision making. The quality of information is high if it creates managerial impact leading to attention, decision and action. The quality of information can be measured on the four dimensions viz utility, satisfaction, error and bias.

The utility dimension has four facets – the form, the time, the access and the possession. If the information is presented in the form the manager requires then its utility increases. If it is available when needed, the utility is optimized.

The one common key of measuring the quality could be satisfaction of the decision maker. The degree of satisfaction would determine the quality of information. An error is the third dimension of the quality of information. **The errors creep in an account of various reasons namely :**

1. An incorrect data measurement.
2. An incorrect collection method.
3. Failure to follow the prescribed data processing procedure.
4. Loss of data.
5. Poor application of data validation and control systems.
6. A deliberate fabicfication.

An erroneous information is a serious problem because the decision maker cannot make the adjustment as he is not aware of it in terms of location and quantum of error.

If the information is processed out of a biased data it will have a bias. The procedure of communicating the information should be such that the system is able to detect the degree and the nature of bias and correct information accordingly.

Q10. Discuss the Information System in organisation. Describe the developments leading to emergence of information systems.

Ans. It is a type of data processing system which collects the data from different sources, processes that data and then generates information from the data to use it for different applications within the organization. **For Example,** In an organisation the information system collects the data from various systems such as the finance system and the sales system at the suppliers side. The information system processes these data and generates information for the customer and customers provide feedback to the supplier depending on the information processed by the information system.

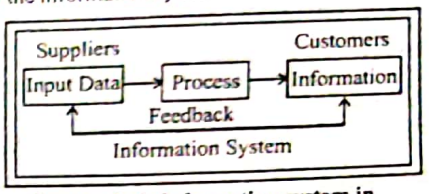

Figure : Basic Information system in an organization

Information systems are basically the systems that help in maintaining and managing the information.

Information System Development :

Information technology departments in large organizations tend to strongly influence information technology development, use and application in the organizations, which may be a business or corporation. A series of methodologies and processes can be used in order to develop and use an information system. Many developers have turned and used a more engineering approach such as the System Development Life Cycle (SDLC) which is a systematic procedure of developing an information systems through stages that occur in sequence.

An information system can be developed in house (within the organization) or outsourced. This can be accomplished by outsourcing certain components or the entire system.

System development is done in stages which include :

1. Problem recognition and specification.
2. Information gathering.
3. Requirements specification for the new system.
4. System design.
5. System construction.
6. System implementation.
7. Review and maintenance.

A computer based information system, is :

1. A technologically implemented medium for recording, storing and disseminating linguistic expressions.

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2. As well as for drawing conclusions from such expressions.

Which can be formulated as a generalized information systems design mathematical program. Geographic Information Systems, Land Information Systems and Disaster Information Systems are also some of the emerging information systems but they can be broadly considered as spatial information systems.

Q11. How information systems are interdependent on each other?

Ans. An **Information System** (IS) - or **application landscape**- is any combination of **information technology** and people's activities that support operations, management, and decision making. In a very broad sense, the term *information system* is frequently used to refer to the interaction between people, processes, data, and technology. In this sense, the term is used to refer not only to the **Information and Communication Technology** (ICT) an organization uses, but also to the way in which people interact with this technology in support of business processes.

Some make a clear distinction between information systems, computer systems, and business processes. Information systems typically include an ICT component but are not purely concerned with ICT, focusing instead on the end use of information technology. Information systems are also different from business processes. Information systems help to control the performance of business processes.

Alter argues for an information system as a special type of work system. A work system is a system in which humans and/or machines perform work using resources to produce specific products and/or services for customers. An information system is a work system whose activities are devoted to processing (capturing, transmitting, storing, retrieving, manipulating and displaying) information.

As such, information systems inter-relate with **data systems** on the one hand and activity systems on the other. An information system is a form of **communication** system in which data represent and are processed as a form of social memory. An information system can also be considered a semi-formal language which supports human **decision making** and action.

Information systems are the primary focus of study for the **information systems discipline** and for **organisational informatics**.

Components : It consists of computers, instructions, stored facts, people and procedures.

ISs can be categorized in four parts :

1. Management Information System (MIS)
2. Decision Support System (DSS)
3. Executive Information System (EIS)
4. Transaction Processing System (TPS)

Q12. Give the ways for using Information System. What are the types of man-made information system?

Ans. There are three ways to use an information system that adds a value to business organisation.

The Information Systems can be Used :

1. For automating, i.e., for doing things faster.
2. For organisational learning i.e., for doing things better.
3. For achieving strategy i.e., for doing things smarter.

It Plays Three Vital Roles in Business Forms:

It supports an organisations business operations, managerial decision making and strategic advantage.

Types of Man-made Information Systems are:

1. Formal Information System.
2. Informal Information System.
3. Computer Based Information System.

1. Formal Information System : It is based on the organisation represented by the organisation chart. The chart is a map of positions and their authority relationships, indicated by boxes and connected by straight lines. It is concerned with pattern of authority, communications and work flow. In this information system, information is formally disseminated in instructions, memos or reports from top management to the intended user in the organisation. This structure also allows feedback up the chain of command for follow-up. The

elements of this system are input from the environment, that provides impetus for policy decisions by top management, during processing, policies are translated into directions, rules and regulations and transmitted to a lower-level management for implementation and the output that represents employee performance.

2. Informal Information System : It is an employee based system, designed to meet personnel and vocational needs and to help solve work-related problems. It also funnels information upward through indirect channels. It is a useful system, because it works within the framework of the business and its stated policies. The knowledge about the inner workings of the employee-based system is useful during the exploratory phase of analysis.

3. Computer-Based Information System : This type of information system relies on the computers for handling business applications. Systems analysis relies heavily on computers for problems solving. There are many kinds of computer-based information system – Management Information System (MIS), Decision Support System (DSS), Transaction Processing System (TPS) and Office Automation System (OAS).

Q13. Explain the Information System Framework for Business Professionals.

Ans. A framework is a brief set of ideas and assumptions for organizing a thought process about a particular type of thing or situation. The information system framework provides a useful lens for examining almost any computerized and non-computerised system in an organisation.

O' Brien has used a five area IS framework for summarizing any information system. ***The conceptual framework that organises knowledge about information system is as follows :***

1. **Foundation Concepts :** They are the basic information system concepts about the trends, components, role and products of an information system needed by business professionals. They also include competitive strategy concept for providing the strategic advantage.
2. **Information Technologies :** This area include major concepts, developments and managerial issues involved in hardware, software, telecommunication network and data resource management technologies.
3. **Business Applications :** How business use Internet and other information technologies to support their business processes, e-business and ecommerce initiatives and business decision making is grouped under this category. It includes the enterprise and functional business system, E-Commerce applications and issues and the decision support in business.
4. **Development Process :** Developing and implementing Business / IT strategies and systems and managing the organisational change. Various development methodologies are explored. The business issues involved in IS development are looked into.
5. **Management Challenges :** The challenges of business / IT technologies and strategies including security, ethical and societal challenges and global IT management.

Q14. "Information is not only relevant, but also critical for the decision maker"? Give reasons to support your view.

Ans. Information has a great impact on decision making and hence its value is closely tied to the decisions that result from its use. Information does not have an absolute universal value. Its value is related to those who use it, where it is used and in what situation it is used.

Information supports decisions, decisions trigger actions and actions affects the achievement or performance of the Organisation. If we can measure the differences in performance, we can trace the impact of Information, provided that the measurement are carefully performed, the relationship among variables are well-defined and possible effect of irrelevant factors are isolated. The measured difference in performance due informational factors is called the 'realistic value' or 'revealed value of Information'.

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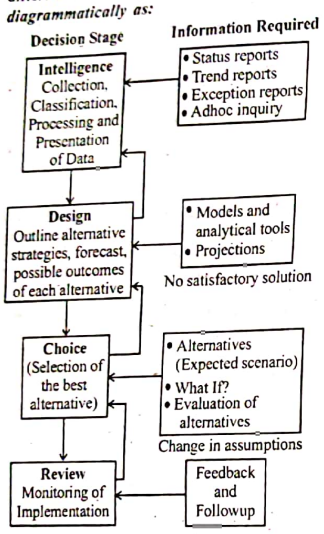
The decision making process is often obscure and the outcomes are sealed by multiple and incompatible dimensions. In such cases, we may either attempt to perform a multiple attribute analysis or derive an overall subjective value. The subjective value reflects people's comprehensive impression of Information and the amount they are willing to pay for specific information. Thus, Information is required at each level of decision making process, but the nature of information is different at each stage. ***This can be summarized diagrammatically as:***



Information is not only relevant, but also critical for the decision maker as the quality of decision depends on Information. ***More specifically Information is useful for the decision maker as:***

1. It helps in minimizing, if not eliminating altogether the elements of risk and uncertainty in decision making.
2. It minimises the element of 'surprise' and 'uncertainties' in decision making.
3. It improves the quality of decision making.
4. It helps to achieve the most optimum results within giving constraints.
5. It affects the decision making behaviour.

Q15. Identify the business functions and the information needs of a business organisation in relation to these business functions.

Ans. Identify the Business Function and Information needs of a Business Organisation:

The business function and information needs of a business organisation arise from the processors the style by which management runs the business. If the decision processes are centralized at a higher level and delegation of responsibilities and authorities is not proper, then IT choice will weigh heavily in favour of the distributed data acquisition system. If the decision processes are decentralised, the IT choice will weigh in favour of those systems, where the acquisition, processing, analysis and decision making will be at distributed nodal points.

There are other business situation where due to sensitive nature of the business, decision making is concentrated at one business location or in one of the business functions such as marketing, research and development, manufacturing etc. The IT choice is largely governed by the information needs of that particular location or function.

For Example : Suppose there is an organisation the main business of which is marketing of a variety of products through a nationwide distribution channel system. The business here operates mainly on satisfying the needs of the buyers by providing them what they want. Hence inventory management is the main business function here. The IT choice in such case will be the one where the sales and the receipts data is processed very fast, the inventory related decisions are taken, stocks are adjusted and the procurement action is also taken quickly.

There are certain organisations the operations of which are such that if the organisation takes care of one or two major functions, most of the information needs and MIS needs would be satisfied. Many times these functions are special and would be demanding special hardware and software.

Q16. Define information resource management. Explain how it can help an organization to better manage its information resource.

Ans. (IRM) A philosophical and practical approach to managing government information. Information is regarded as a valuable resource which should be managed like other resources, and should contribute directly to accomplishing organizational goals and objectives. IRM provides an integrated view for managing the entire life-cycle of information, from generation, to dissemination, to archiving and/or destruction, for maximizing the overall usefulness of information, and improving service delivery and program management.

Techniques of managing information as a shared organizational resource. ***IRM includes :***

(1) Identification of information sources,
(2) Type and value of information they provide,
(3) Ways of classification, valuation, processing, and storage of that information.

IRM views information and Information Technology as an integrating factor in the organisation, that is, the various organisational positions that manage. Information are coordinated and work together toward common ends. Further, IRM looks for ways in which the management of Information and Technology are interrelated, and fosters that interrelationship and organisational integration. ***IRM includes the management of***

(1) The broad range of information resources, e.g., printed materials, electronic information, and microforms,
(2) The various technologies and equipment that manipulate these resources, and
(3) The people who generate, organise, and disseminate those resources.

Overall the intent of IRM is to increase the usefulness of government information both to the government and to the public.

Q17. With the advent and use of information technology, it is now possible to implement the classical theory of management of planning and control. Discuss.

Ans. With the Advent and use of IT, Now Possible to Implement Classical Theory of Management:

There are three well-established theories of classical management- Taylor's theory of scientific management, Fayol's administrative theory, Weber's Theory of Bureaucracy – although these schools or theories; developed historical sequence, later ideas have not replaced earlier one. Classical management theory recognises the role that management play in an organization. It was first proposed by Henri Fayol. In contrast to the purely scientific examination of work and organization conducted by Fayol, Fayol proposed that any industrial undertaking had six functions : Technical, commercial, financial, security, accounting and managerial. Fayol has identified general principles of management : division of work, authority and responsibility, discipline, unity of command, unity of direction, subordination of individual, remuneration of personnel, chain of authority, centralization.

IT, that assortment of technology that enables the conversion of data into information, has had an enormous impact on the field of classical theory of management. It begins with a discussion of one of the primary impacts of IT on public administration theory : the development of systems theory and its descendants including the study of complex systems, chaos and complexity theory. The importance of IT in decision making is explored next.

The third role examined is the use of IT as a research tool to make previously intractable problems solvable. Fourth, the significance of IT as a change agent that calls for revision of other theoretical postulates investigated.

Role of IT in classical theory is important because it helps to study how to make all people in an organization more productive. It helps to maximize labor productivity computer systems, system and application software and telecommunication networks provide a computing and communication infrastructure or platform that supports the use of IT in classical theory of management.

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Q18. How is information technology changing the way marketing function is performed ? What are the advantages of using Internet for establishing contacts with the customers ?

Ans. Information Technology Changing the Way of Marketing Function :

The marketing function deals with satisfying the consumer. The scope of function starts from identifying the need of consumer, evolving product concept, designing the product, positioning the product in market and selling at appropriate price. Marketing managers try to maximize sales at the lowest possible costs for advertising and promotion. IT automate the sales and product management and increase revenue through targeted marketing. Targeted marketing has become an important tool in developing advertising and promotion strategies for a company's electronic commerce websites. ***Targeted marketing is an advertising and promotion management concept that includes five targeting components :***

1. **Community :** Companies can customize their web advertising messages and promotion methods to appeal to people in specific communities.
2. **Content :** Advertising such as electronic bill boards or banners can be placed on various website pages in addition to company's home page.
3. **Context :** Advertising appears only in web pages that are relevant to the content of a product.
4. **Demographic :** Marketing efforts can be aimed only at specific types of classes of people: unmarried, middle income etc.
5. **Online Behaviour :** Advertising and promotion efforts can be tailored to each visit to a site by an individual.

Advantages of Using Internet for Establishing Contacts with Customers :

Internet marketing is relatively inexpensive when compared to ratio of cost against the reach of the target audience. Internet marketing can offer a greater sense of accountability for advertisers.

Internet marketing is sometimes considered to have a broader scope because it only refers to the internet, e-mail, and wireless media, but it includes management of digital customer data and electronic customer relationship management (ECRM) systems.

Another Advantages are :

- Ability to market our services for free or at a low cost.
- Ability to sell anything online.
- Ability to collect payment online.
- People are open to share their knowledge on the internet.

Q19. What are the elements of the system?

Ans. Elements of a System :

The various elements of a system are as follows:

1. **Outputs and Inputs :** Every system produces some output, that has value to its user and takes some input for processing. A system feeds on input to produce an output.
2. **Processor(s) :** This element of system involves the actual transformation of input into output. It is the operational component of a system. It may modify the input totally or partially depending on the specifications of the output.
3. **Control :** This element guides the system. It is the decision-making subsystem, that controls the pattern of activities governing input, processing and output.
4. **Feedback :** Control in a dynamic environment is achieved by feedback. Feedback measures output against a standard in some form of cybernetic procedure that includes communication and control.
5. **Environment :** It is the ***"suprasystem"*** within which an organisation operates. It is the source of external elements that impinge on the system. It often determines, how a system must function.
6. **Boundaries and Interface :** Each system has boundaries that determine its sphere of influence and control. The boundaries of system determine the nature of its interface with other systems for successful design.

Q20. What are the characteristics of a system?

Ans. The characteristics of a system are as follows :

(a). Organization : Organization implies structure and order. It is the arrangement of components that helps to achieve objectives. In the design of business system, **For Example,** the hierarchical relationships starting with the president on top and leading downward to the blue-collar workers represents the organization structure.

Such, an arrangement portrays a system-subsystem relationship, defines the authority structure, specifies the formal flow of communication and formalizes the chain of command.

(b). Interaction : Interaction refers to the manner, in which each component functions with other components of the system. In an organization, **For Example,** purchasing must interact with production, advertising with sales, and payroll with personnel.

(c). Interdependence : It means that parts of the organization or computer system depend on one another. They are coordinated and linked together according to a plan. One subsystem depends on the input of another subsystem for proper functioning; that is, the output of one subsystem is the required input for another subsystem.

(d). Integration : Integration refers to the holism of systems. It is concerned with how a system is tied together. It means that parts of the system work together within the system, even though each part performs a unique function.

(e). Central Objective : The last characteristic of system is central objective. Objectives may be real or stated. Users must know the central objective of a computer application early in the analysis for a successful design and conversion and analyst must work around to identity the real objective of the proposed change.

Q21. What are the characteristics of open system?

Ans. The Characteristics of Open System are as follows :

1. **Input From Outside :** Open systems are self-adjusting and self-regulating. When functioning properly, it reaches a steady state or equilibrium.
2. **Entropy :** All dynamic systems tend to run down over time, resulting in loss of energy. Open systems resist entropy by seeking new inputs or modifying the processes to return to a steady state.
3. **Processes, Output and Cycles :** Open systems produce useful output and operates in cycles, following a continuous flow path.
4. **Differentiation :** Open systems have a tendered an increasing specialisation of functions and a greater differentiation of their components.
5. **Equifinality :** This term implies that goals are achieved through differing courses of action and a variety of paths.

System analysis as an open system tends to expand the scope of analysis to relationships between the user area and other users and to environmental factors that must be considered before a new system is finally approved. In open system, the analyst has to be flexible and the system being designed has to be responsive to the changing needs of the user and the environment.

Q22. Write short note on MIS and system analysis

Ans. MIS and System Analysis :

System analysis plays a central role in the development of the MIS. Since the MIS is a conglomerate of the various systems, a systematic approach in it's development helps in achieving the objective of the MIS. Each system within the MIS plays a role which contribute to the accomplishment of the MIS objective.

The tools of the system analysis and the methods of development enforce a discipline on the designer to follow the steps strictly as stipulated. The possibility of a mistake or an inadvertence is almost ruled out. The success of MIS lies in meeting the information needs of the various personnel in the organisation across all level in the management. The system analysis with its structural analysis and design approach ensures an appropriate coverage

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of the subsystem.

The system analysis begin with the output design which itself ensures that the information needs are considered and displayed in the appropriate report or screen format. The subsequent design steps (viz. input process, procedure design are taken to fulfill these) needs.

The MIS may call for an open system design.

The systems analysis and design, as a tool of the MIS development, helps in streamlining the procedures of the company to current needs of the business and information objectives. The system analysis and design exercise considers the testing the feasibility of the system as an important step.

The MIS development process largely relies on the systems analysis and design as a source of the scientific development of the MIS.

The system analysis is not restricted to the data process output. It also covers the technologies which enables the process feasible.

Q23. Why is the business and business environment knowledge important? What strength does it add at the time of designing the MIS ?

Ans. Knowledge of Business and its Environment :

Business firm is an open, adaptive organizational system operating in a business environment. *A business consists of the following components:*

1. **Input :** Economic resources such as people, money, material, machine, land, facilities, energy and information are acquired by a business from its environment and used in its system activities.
2. **Processing :** Organizational processes such as marketing, manufacturing and finance transform input into output.
3. **Output :** Products and services, payments to employees and suppliers, dividend, contributions, taxes and information are all output produced by a business and exchanged with or transferred to its environment.
4. **Feedback :** A primary role of IS is serving as the feedback component of an organization system.
5. **Control :** Managers control the operations of a business so that its performance meets organizational goals such as profitability, market share and social responsibility.
6. **Environment :** A business is open, adaptive system that shared inputs and output with its environment.

Knowledge of business and its environment is very important for the end users. Only after having proper knowledge of business, its users should be able to identify.

(i) The people, hardware, software, data and network resource they use.

(ii) The types of information products they produce.

(iii) The way they perform input, processing, output, and control activities.

(iv) How they support the business operations, managerial decision making or competitive advantage of a business.

Knowledge of business and its environment add strength at the time of designing MIS. The MIS draws data from its own source and uses it in the application of a variety of tools and techniques to solve the management problems in business. The MIS uses knowledge from management, business-management, mathematics, psychology, communication theory, or and probability theory for building processes, methods and DSS in designing business application. In MIS designing the information is recognised as a major resource like capital, time and capacity. And if this resource is to be managed well, it calls upon the management to plan for it and control it for the appropriate use of the organisation. The knowledge information creates an awareness of those aspects of business where the manager is forced to think, decide and act. Such an information shows the trend of the activity or a result against the time scale.

The knowledge information may cut across the functional boundaries of the organisation. The action or decision may fall in other functional areas of business operation.

Q24. Explain physical and logical design of an information system. Also justify that "Database design is the part of one of these".

Ans. Design is a meaningful engineering representation of something that is to be built. In software engineering context, design focuses on four major areas of concern : data, architecture, interfaces and component.

The design of an information system produces the details that state how a system will meet the requirement identifies during system analysis. This stage is referred as **logical design**. The process of developing the software is known as **physical design**.

During design we make decisions that will ultimately effect the success of software construction and the ease with which software can be maintained. A design should exhibit an architectural structure that has been created using recognizable design patterns and should be modular. A design should lead to data structures that are appropriate for the objects to be implemented and should lead to components that exhibit independent functional characteristics.

The software design process encourages good design through the application of fundamental design principles, systematic methodology and thorough review. Ultimately, a design specification is produced. The specification is composed of the design models that describe data, architecture, interferes and components. Each is a work product of the design process.

Database or Data Design creates a model of data that is represented at a high level of abstraction. In past, data architecture was limited to data structures at the program level and databases at the application level. But today, large businesses have dozens of databases serving many applications encompassing hundreds of gigabytes of data. To solve this challenge, the business IT community has developed data mining techniques that navigate through existing databases in an attempt to extract appropriate business - level information. An alternative solution, called a data warehouse is added an additional layer to data architecture.

A data warehouse is a separate data environment that is not directly integrated with day-to-day applications but encompasses all data used by a business. Data design at component level focuses on the representation of data structures that are directly accessed by one or more software components.

Data design translates the data objects defined in the analysis model into data structures that reside within the software. The attributes that describe the objects, relationship between the data objects and their use within the program all influence the choice of data structure. At a higher level of abstraction, data design may lead to the definition of an architecture for a database.

Q25. What components of production information systems would be suitable in a manufacturing organisation ? Would you suggest use of production information system even in traditional manufacturing industries such as textiles ?

Ans. Components of Production Information System suitable in Manufacturing Organisation:

Three types of production information system can be identified, certain features of which influence the actions of production managers and ultimately influence the manufacturing organisation. **Three types are :**

1. Small batch and unit production
2. Large batch and man production
3. Continuous process production

Important components of production information system :

1. Lean manufacturing
2. Flexible manufacturing
3. Total Quality Management
4. Enterprise Resource Planning (ERP) & Custom Relationship Management (CRM)

Use of Production Information System in Traditional Manufacturing Industries (example Textiles) :

The textile industries have changed tremendously in last few years. To sustain competitive advantage, companies must re-examine and fine tune their business processes to deliver high quality goods at

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very low costs. Most companies have now outsourced manufacturing to low labour. Globalisation lead to increase in competition and quality awareness and therefore it has become very important for textile industry to integrate itself with IT to survive. ERP is a production information system that allows information to enter at a single point in process and updates a single shared database for all function directly or indirectly depend on this information.

ERP solutions came into existence in corporate world due to various problems faced in MIS. In every sector of our textile business, the market is forcing companies to stay competitive by taking proactive steps to improve operations. In the pursuit of profitable growth in a global market place, mills are looking for new strategies to improve the quality, cut costs, respond swiftly to changes in customer demands and fo vagaries in row material supply position, expand globally, develop new distribution channels and fo new value added relationships with suppliers and customers. With the increase in competition and quali awareness within and outside India, no developing and progressive industry would be able to survive f long without application of enterprise resource planning (ERP). It plans and control various operation right from the purchase upto selling of the product.

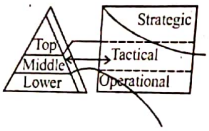
Controlling of the different textile mills in the different locations can be made easy by this system. It helps in planning for optimizing and scheduling of production orders.

SECTION - C
Long Answer Questions
(15 Marks Each)

Q26. Explain different types of Information.

Ans. Different types of decisions needs, different types of Information. Therefore, ***Information which is needed at different levels of Management are :***

1. Operational Information
2. Tactical Information
3. Strategic Information



1. Operational Information :

Operational Informations are such Informations which refers to the everyday needs of the organisation, which are needed for control over business activities. These are known as routine activities or repetitive in nature. These activities are controlled by lower level Management. The Information regarding the Cash Position on day to day basis is monitored and controlled by lower levels of management. Similarly, in marketing function daily and weekly Sales information is used by lower level manager to monitor the performance of Sales force. Operational Information generally consist of Information related to the work status, Consumer orders and stocks in hand. Thus, we can say Operational level requires information for regulating and implementing operational plans for the purpose of conversion of inputs into outputs. It also supplies routine and other information.

2. Tactical Information :

Tactical information will be used for medium / short term planning by the Middle Management. Budgets, forecasts, analysis of cash / funds flow projections etc are the part of tactical information. Such information is mostly from the internal environment and partly from the external environment such as customer perceptions, competitor's strategy and pricing. It has medium term impact. Tactical Information helps the middle level managers in allocating resources and establishing controls to implement the top levels plans and policies of the Organisation.

For Example :

(a) Information regarding the alternative source of funds and their uses in the short run.

(b) Opportunities for deployment of surplus funds in short term securities etc. The tactical information is generally predictive, focusing on short term trends of the business unit. It is usually prepared regularly and is used for the decision-making referred to as Management Control.

(c) Another important function of Tactical Level is to supply information to strategic tier for the use of top Management. This tier collects the required information from strategic and operational tier / levels and thus serves as a bridge between strategic and operational tiers of information. It is vital for making control related decisions in an organisation.

3. Strategic Information :

The operational information is needed to find out how the given activity can be performed better, strategic information is needed for making alternative choices among the business options. The strategic information helps in identifying and evaluating the options so that a manager makes informed choices which are different from the competitors and the limitation of what the rivals are doing or planning. Such choices are made by owners of the business. Strategic information is used by managers to define goal and priorities, initiate new programmes and develop plans and policies for acquisition and use of firms resources such as : Information regarding the long term need of funds for on going and future projects of the company may be used by top level managers in taking decision regarding going public or approaching financial institutions for term loan. Strategic information is predictive in nature, relies heavily on external sources of data, has a long term perspective. It is believed that strategic information is basically information regarding the external environment. However, it is now well recognized that the internal factors are equally responsible for success or failure of strategies and thus internal information is also required for strategic decision making.

Conclusion :

It may be noted that each type of information has its role to play in managerial effectiveness. Each type of information is needed with varying degree by the managers at all levels. Thus, a part of operational information may be used by the chief executive officer of a company.

Q27. List the Process of Generation of Information.

OR

List the various activities that are to be carried out for the process of generation of Information.

Ans. The process of generation of information involves a series of activities, which may be:

1. Data Acquisition
2. Data Transformation
3. Management of Information

1. Data Acquisition :

Data are facts expressed with the help of symbols such as alphabets, digits, graphs, diagrams, pictures etc. Data may describe an event or it may represent status of an element of the environment. Whatever may be the source of data, it may be initially recorded and later verified for accuracy and authenticity. This activity is called **'Data Captured'**.

Data may be captured by punching with keyboard or scanning with scanning devices, facts from documents on which they were recorded. In case, data are already recorded on Computer media such as disks and tapes, Data Capture may take place

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by selecting the relevant part of that recording for meeting the data needs for the purpose on hand. As Data Capture and Storage have a cost, it is necessary to be selective in capturing data.

Most of the data captured for Business Information System are organised in data files. Each file contains records relating to various data elements (fields) expressed with the help of symbols (Characters).

2. Data Transformation :

Data transformation may be done by performing any of the following operations on data:

(a). Rearranging
(b). Classifying
(c). Calculating
(d). Summarising

(a). Rearranging : Rearranging data in some specified order is a very common data processing activity. **For Example,** Data regarding stores may be arranged in order of date of purchase or in order of value of each unit or in the alphabetic order of names of these items. Such a rearrangement is also known as Sorting of data. Sorting may add to the usefulness of data.

(b). Classifying : Data may be classified on the basis of the selected factors / variables. **For Example,** Sales data may be classified on the variables like Customer's code, city, product or Sales person involved in obtaining order. Classification is a commonly used data processing operation particularly in obtaining Information System.

(c). Calculating : Data is processed only by Calculating. A Series of Calculations performed on numeric values is called Computation. That is perhaps, how computers aimed got their name as earlier generations of Computers aimed at providing Computing facilities. Even as the diverse forms of data can now be processed with the help of Computers, the process of generation is predominantly Computing. Calculating involves performing arithmetic operations (like addition, subtraction, multiplication, decision and logical operations). **For Example,** financial ratios may be calculated by performing arithmetic operations on various values in financial statements.

(d). Summarising : Summarising is a process aggregating various data elements, reducing the bulk of data to a more meaningful form. **For Example,** a Finance Manager may be interested in knowing the total number of shares applied for in a public issue. The data in this regard may be summarised and such summary report may be more useful to him than the entire statement giving details of each share application received.

Summarising is a short narration for each class of share applications received i.e. individuals, corporate body, trust etc. or a number of shares applied for in etc.

3. Management of Information :

Once acquisition and/or transformation is done the processed data may be either communicated to the end user or may be stored for future sake. When the information is to be communicated to the user the format of the reporting may include simple columnar / tabular format or usual formats such as charts, diagrams, graphs etc. With the availability of faster Computers and better display devices information mapping and visualization techniques are becoming popular. In case, the information generated is to be used in future it may be stored on some mass storage medium. Such activities of communicating and /or storing information may be termed as 'Managing Information'.

Q28. Differentiate between data and information. Examine the role of information at various levels of organizational hierarchy.

Ans. The words **Data** and **Information** may look similar and many people use these words very frequently, But both have lots of differences between them.

Data :

1. The word 'Data' is derived from the plural form of latin word 'Datum', which means 'to give'.
2. Originated at mid 17th century.
3. Data is a collection of raw facts.
4. May or may not be meaningful.
5. Input to any system may be treated as Data.

6. Understanding is difficult.
7. Data must be processed to understand.
8. Data may not be in the order.
9. Example: Statistics, numbers, characters, images.

Information :

1. The word 'Information' is derived from latin word 'Informare', which means 'to instruct'.
2. Originated at late middle time.
3. Information is the outcome derived after processing the data.
4. Information is always meaningful.
5. Output after processing the system is Information.
6. Understanding is easy.
7. Information is already in understandable form, it may be processed further to make it more understandable.
8. Information should be in the order.
9. Example Reports, Knowledge.

Informational Roles :

Informational roles are those in which managers obtain and transmit information. These roles have changed dramatically as technology has improved. The monitor evaluates the performance of others and takes corrective action to improve that performance. Monitors also watch for changes in the environment and within the company that may affect individual and organizational performance. Monitoring occurs at all levels of management, although managers at higher levels of the organization are more likely to monitor external threats to the environment than are middle or first-line managers. The role of disseminator requires that managers inform employees of changes that affect them and the organization. They also communicate the company's vision and purpose.

Managers at each level disseminate information to those below them, and much information of this nature trickles from the top down. Finally, a spokesperson communicates with the external environment, from advertising the company's goods and services, to informing the community about the direction of the organization. The spokesperson for major announcements, such as a change in strategic direction, is likely to be a top manager. But, other, more routine information may be provided by a manager at any level of a company. For example, a middle manager may give a press release to a local newspaper, or a supervisor manager may give a presentation at a community meeting.

Q29. What are different methods of data and information collection? Explain.

Ans. Methods of Data and Information Collection :

Several methods are available for the collection of data. The choice of method will have an impact on the quality of information. Similarly, the design of data collection method also decides the quality of data and information. The methods of data collection and processing become a part of the MIS. An awareness of these methods is essential to the manager. Further, he should also understand the potential problems of bias, currency and the fact versus the opinion in the various types of methods. The observation, the experiment, the survey and the subjective estimation are the methods chosen for data collection and information about a specific problem, while the remaining methods are chosen to collect data on a routine basis without any particular problem whatsoever.

The table below summarizes the main methods of data and information collection :

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Method	Commentary
Keyboard	A very familiar input device. Typically used to input data into personal computer applications such as databases and spreadsheets
Touch-sensitive screens	Developed to allow computer monitors to be used as an input device. Selections are made by users by touching areas of a screen. Sensors, built into the screen surround detect what has been touched. These screens are increasingly used to help external customers input transactional data - e.g. buying transport tickets, paying for car parking or requesting information
Magnetic ink character recognition (MICR)	MICR involves the recognition by a machine of specially-formatted characters printed in magnetic ink. This is an expensive method to set up and use - but it is accurate and fast. A good example is the use of magnetic ink characters on the bottom of each cheque in a cheque book
Optical mark reading (OMR)	Optical Mark Reading (OMR) uses paper based forms, on which users simply mark (using a dash) to answer a question. OMR needs no special equipment to mark a form other than a pen/pencil. Data can be processed very quickly and with very low error rates. An OMR scanner then processes the forms directly into the required database. An example we are probably familiar with is the National Lottery entry forms, or answer sheets for those dreaded multiple choice exam papers!
Bar coding	Bar codes are made up of rectangular bars and spaces in varying widths. Read optically, these enable computer software to identify products and items automatically. Numbers or letters are represented by the width and position of each code's bars and spaces, forming a unique 'tag'. Bar codes are printed on individual labels, packaging or documents. When the coded item is handled, the bar code is scanned and the information gained is fed into a computer. Codes are also often used to track and count items.
EFTPOS	EFTPOS stands for **Electronic Funds Transfer at Point Of Sale**. We will find EFTPOS terminals in certain shops. An EFTPOS terminal electronically prints out details of a plastic card transaction. The computer in the terminal gets authorization for the payment amount (to make sure it's within the credit limit) and checks the card against a list of lost and stolen cards.
Magnetic strip cards	A card (plastic or paper) with a magnetic strip of recording material on which the magnetic tracks of an identification card are recorded. Magnetic strip cards are in widespread use as a way of controlling access (e.g. swipe cards for doors, ticket barriers) and confirming identity (e.g. use in bank and cash cards).
Smart cards	A smart card (sometime also called a "chip card") is **a plastic card with an embedded microchip**. It is widely expected that smart cards will eventually replace magnetic strip cards in many applications. The smart chip provides significantly more memory than the magnetic strip. The chip is also capable of processing information. The added memory and processing capabilities are what that enable a smart card to offer more services and increased security. Some smart cards can also run multiple applications on one card, thus reducing the number of cards required by any one person.
Voice recognition	A data collection technology that **converts speech into text** or interprets it as a sequence of computer commands. Voice recognition is most common in data entry and word processing environments and fields where a user needs to interact with a computer without using their hands.
Web Data Capture	Web data capture use electronic forms on either on an Intranet or Internet. They are becoming increasingly popular and have the advantage of being accessible by any user having access to a computer. Users complete the questions online and the returned data is then imported in electronic format to the required database.

Q30. What is an Information System ? Write down the various characteristics of information system.

Ans. An information system is a system that accepts resources (data) as input and processes them into products (information) as output. Information system provides information (feedback) on the operations of the system to management for the direction and maintenance of the system (control) as it exchanges input and outputs with its environment.

1. Information system is the study of information production, flows and use within organisations.
2. Information system is any organised combination of people, hardware, software, communications networks and data resources that collects, transforms and disseminate information in an organisation.
3. Information system is a set of procedures organised to generate information that enable managers to review operational, tactical and strategic planning activities. In broad sense, an information system consists of both physical and non-physical components. A computer combined with software may constitute an information system, if it produces information that helps an organisation attain its goal.

Information system can be defined technically as a set of interrelated components that collects, transforms, stores and disseminates information in an organisation to help managers in.

1. Decision Making
2. Coordination and control,
3. Analyzing problems,
4. Visualizing complex subjects and
5. Creating new products

Information system makes extensive use of information technology artifacts.

The various characteristics of information system are as follows :

(a) Perfection : Perfection refers to availability updating of information. there is a famous quotation "knowledge is a wealth" means the need of information is always in perfection and should be updated. More carefully, the information should be available as and when it requires.

(b) Correct and Accurate : Information or knowledge should be always correct and accurate the wrong information leads to wrong decision. Therefore, it must prevent inaccurate and incorrect data or information from the grassroots level. To prevent, information errors one should take an appropriate measure in storage process and retrieving loss of data, a deliberate falsification and wrong processing methods and so on.

(c) Concise : Information must be very brief and specific. Too much data or information may misleads and confuse the others. Therefore, it should be every concise and brief in nature.

(d) Avoid Ambiguity : Quality of information creates a quality of decision making. Therefore the decision makers should have perfect and unambigous information. So the system is check to avoid the redundancy of data, because it creates lot of ambiguity in taking of right decisions.

(e) Completeness : The purpose of information is to support decision making. So that is should not only accurate but also complete without omitting critical issues.

(f) Validity and Impartiality : Validity and Impartiality are the two qualifiers for qualitative information. Unbiased information never gives result to anyone. At the same time the information must be valid in nature separated information is quite supportive to the decision makers. The old and outdated information is simply spoils the nature of work and also burden to the management in organising them. Therefore, the information should be dynamic in nature.

(g) Consistency and Reliability : Both Characteristics must qualify the perfection of information. Consistency means continuous without any breaks or gaps, and reliability refers to confidence level that the information is accurate.

(h) Suitable Format : Good information should be kept in an appropriate format. It should contain proper fields and contents which are about to understood by the users. All the managers extracts the relevant information in these reports only, so it should be correct and contains perfect information. Therefore, the suitable format of information or report of information is a prominent features of information.

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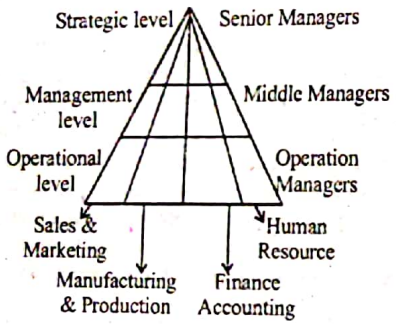
Q31. Discuss in detail various types of Information System.

Ans. Information system involves collection, storage and presentation of data for decision-making, progress reporting, planning and evaluation process of an organisation. The information system of an organisation can be classified on the basis of three broad categories

1. The Requirement of the Business
2. The Management Levels
3. The Functions Performed by it

1. On the Basis of the Requirement of the Business :

Individuals at different levels require different resources to perform their tasks. A group of different individuals working together to achieve the objectives of the organisation is known as a system. The information system of an organisation can be divided into various categories depending upon the requirements of the business.



(a). Operational Level System : The operational level system helps the operation managers to provide all the data related to the transactions of the organizations. Such as the sales and flow of material. Therefore the main objective of the operational level system is to provide proper records regarding the flow of transaction in the organisation such as inventory payment and cash deposits, **for example,** abstracting the record of cash deposits from the Automatic Teller Machine (ATM) or identifying the number of hours each employee worked in one day.

(b). Management Level System : The management level system helps the middle level managers in performing the various functions such as managing and controlling activities or the decision making process of an organisation. Instead of providing instant reports, the management level system helps in providing periodic reports to the managers. The management level system also helps in non-routine decision making. **For Example,** we can use the information collected from the management level system to make decision for the future. In such decisions, the requirement of the information is not always clear. **For Example,** to take decision about how to increase the sales of the organisation the management needs to focus on many factors such as increasing the supply of finished goods in the market and increasing the advertisement cost. Therefore, in taking such decisions the requirement of the information is not clear. The information required may be the data from within the organisation or the data from outside the organisation.

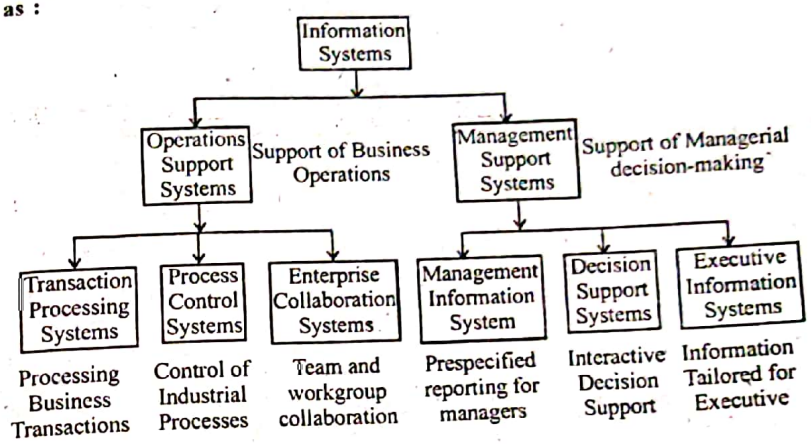
(c). Strategic Level System : The strategic level system help the top level managers to solve the strategic problems and take suitable decisions, which include long term and short term planning of an organisation. Strategic level systems also help in defining the objective and setting the long term and short term goals of an organisation.

The strategic level system supports the long term planning activities of the senior management and deals with matching the actual output with the planned output. It helps in forecasting the sales and budget of an organisation. It also helps in manpower planning and controlling the production of an organisation.

2. On the Basis of Management Levels :

Information is the processed and useful data that helps in activities such as planning, decision-making and making reports of the organisation. Information is required at various levels of the management. The lower level management requires information for making records of activities, while the middle level and top level management requires information for planning and decision-making.

The following are the types of information system on the basis of management levels. These are given as :



Operation Support Systems :

Information systems have always been needed to process data generated by and used in business operations. Such operations support systems produce a variety of information products for internal and external use. However, they do not emphasize producing the specific information products that can best be used by managers. The role of a business firm's operations support system is to efficiently process business transaction, control industrial processes, support enterprise communication and collaboration and update corporate databases.

(a). Transaction Processing Systems : Operations support systems include the major category of Transaction Processing Systems (TPS). Transaction processing system record and process data resulting from business transactions. Typical examples are information system that process sales, purchase, and inventory charges. The results of such processing are used to update customer's, inventory and other organisational databases. These database then provide the data resources that can be processed and used by management information system, decisions support system and executive information system.

Transaction processing systems process transaction in two basic ways:

In Batch processing, transaction's data is accumulated over a period of time and processed periodically. In real time (or online) processing, data is processed immediately after a transaction occurs. **For Example,** point of sale **(pos)** system at retail store may use electronic cash register terminals to capture and transmit sales data over telecommunication links to regional computer centres for immediate (real time) or rightly (batch) processing.

(b). Process Control Systems : Operation support systems also make routine decision that control operational processes. **Examples** are automatic inventory reorder decisions and production control decisions. This includes a category of information systems called Process Control System in which decision adjusting a physical production process are automatically made by computers. **For Example,** a petroleum refinery uses electronic sensors linked to computers to continually monitor chemical processes. The computer monitor a chemical process, capture and process data detected by sensors and make instants real time adjustment to appropriate refinery processes.

(c). Enterprise Collaboration System : Enterprise collaboration systems are information systems that use a variety of information technologies to help people work together. Enterprise collaboration system help us collaborate - to communicate ideas, share, resources and cooperative work efforts as members of the

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many formal and informal process and project teams and other workgroups that are a vital part of today's organisations. Thus, the goal of enterprise collaboration system is to use information technology to enhance the productivity and creativity of teams and workgroups in the modern business enterprise.

Management Support Systems :

When information system focus on providing information and support for effective decision-making by managers, they are called Management Support Systems. Management support systems began when the concept of Management Information Systems (MIS) originated in the 1960's. The MIS concept is still organised as vital to efficient and effective information system in organisations for two major reasons.

1. It emphasizes the management orientation of information technology in business. A major goal of computer based information system should be the support of management decision making, not merely the processing of data generated by business operations.
2. It emphasizes that a systems framework should be used for organising information system application. Business applications of information technology should be viewed as interrelated and integrated computer based information system and not as independent data processing jobs.

(a). Management Information System : Management Information systems are the more common form of management support systems. They provide managerial end users with information products that support much of their day to day decision making needs. Management information system provide a variety of reports and displays to management. The contents of these information products are specified in advance by managers so that they contain information that managers need. Management Information Systems retrieve information about internal operations from databases that have been updated by transaction processing systems. They also obtain data about the business environment from external sources.

Information products provided to managers include displays and reports that can be furnished.

1. On demand.
2. Periodically, according to a predetermined schedule or
3. Whenever exceptional condition occurs.

(b). Decision Support Systems : Decision Support System (DSS) are a natural progression from information reporting system and transaction processing systems. Decision Support Systems are interactive, computer based information system that use decision models and specialised databases to assist the decision making processes of managerial End users. Thus, they are different from transaction processing system which focus on processing the data generated by business transactions and operations, though they extract data from corporate databases maintained by TPS. Decision support systems provide managerial end users with information in an interactive session on adhoc basis. A DSS provide managers with analytical, modeling, simulation, data retrieval and information presentation capabilities. When using a DSS, managers are simulating and exploring possible alternatives and receiving tentative information based on alternative set of assumptions. Therefore managerial end users do not have to specify their information needs in advance. Instead a DSS interactively helps them find the information they need.

(c). Executive Information System : Executive information system are management information systems tailored to the strategic information needs of top management. Top executives get the information they need from many sources, including letters, memos, periodicals and reports produced manually as well as by computer systems. Other sources of executive information are meetings, telephone calls, and social activities.

The goal of computer based executive information system is to provide top management with immediate and easy areas to selective information about lay factors that are critical to accomplishing a firm's strategic objectives. Therefore, EIS are easy to operate and understand. Graphics displays are extensively used and immediate access to internal and external database is provided.

Some other classifications of Information Systems are :

(i). Expert System : An expert system is a knowledge based information system that is, it uses its knowledge about a specific area to act as an expert consultant to users. The components of an expert system are a knowledge base and software modules

that perform inferences on the knowledge and offer answers to user's questions. Expert systems are being used in many different fields, including medicine, engineering, the physical science and business. Expert systems can support either operations or management activities.

(ii). Knowledge Management Systems : Nowadays many companies realize the need that they must become knowledge creating companies or learning organisations in order to survive and flourish in a rapidly changing business environment. That means constantly creating new business knowledge, disseminating it within the organisation and quickly building it to new products and services. The knowledge creating company must find ways to use knowledge management techniques and information technology to encourage employees to share what they know and make better use of accumulated workplace knowledge.

Thus, many organisations are developing Knowledge Management Systems (KMS) to manage organisational learning and know how. Knowledge management systems help knowledge workers create, organise and share important business knowledge wherever and whenever it is needed.

(iii). Strategic Information Systems : The strategic role of information systems involves using information technology to develop, product, services and capabilities that give a company strategic advantages over competitive forces it faces in the global market place. This creates strategic information system, information system that support or shape the competitive position and strategies of an enterprise. So a strategic information can be any kind of information system (TPS, MIS, DSS, etc.) that helps an organisation gain a competitive advantage, reduce a competitive disadvantage, or meet other strategic enterprises objectives.

(iv). Business Information System : As a managerial end user, it is important to realize that information system directly support both operations and management activities in the business functions of accounting, finance, human resource, management, marketing and operations management. Such business information systems are needed by all business functions. **For Example,** Marketing managers need information about sales performance and trends provided by Marketing Information Systems. Business information systems provide managers with a variety of information products to support their decision-making responsibilities in each of the functional areas of business.

3. On the Basis of the Functions Performed :

(a). Sales and Marketing System : Sales and marketing system is an important function of an organisation that involves performing various sales and marketing activities. The sales activities deal with selling the products of the organisation and taking orders from the customers. The marketing activities deal with conducting market research to identify the customers for the products and the customer requirements of an organisation.

The sales and marketing system performs different functions at different levels of an organisation. The sales and marketing system at the strategic level helps the manager to monitor the trends affecting new products and sales opportunities, planning for new products and monitoring the performance of the competitors. At the management level, the sales and marketing system helps in market research, advertising, product promotion campaigns and decisions with respect to the price of the products. At the operational level, the sales and marketing system helps in maintaining a good customer relationship, processing orders and providing customer support to the organisation.

(b). Manufacturing and Production System : The manufacturing and production system of an organisation deals with the actual production of goods and services. It also deals with the planning, development and maintenance of the production failures of the organisation.

At the strategic level, the manufacturing and production system deals with long term production planning such as investing on machineries or establishing a new plant for the production of goods. At the management level it deals with analyzing and monitoring the manufacturing costs and resources available to manufacture a product.

(c). Finance and Accounting System : It deals with all kinds of monetary and accounting activities of an organization. The monetary activities deal with managing the financial assets of the organisation such as cash, stocks and bonds. The accounting activities deal with maintaining all records regarding the cas

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flow of the organisation such as cash receipt, cash payment and cash deposits.

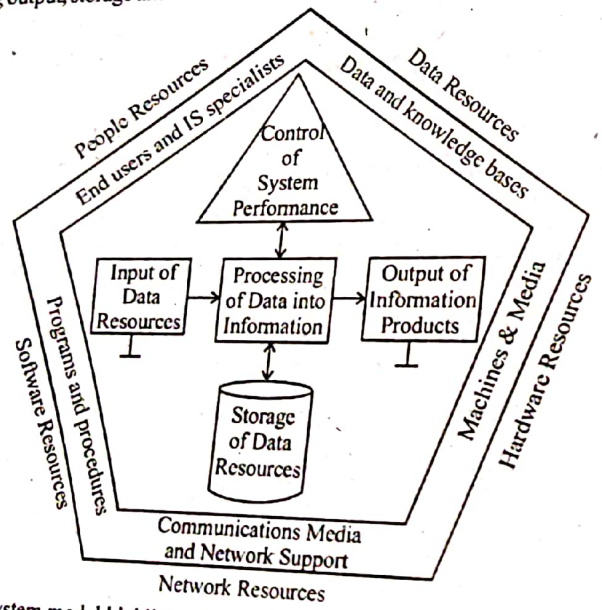
The finance and accounting system helps in managing the financial records of the organisation such as payroll and receipts so as to maintain the flow of cash in and out of the organisation. The strategic level system makes use of the finance and accounting system for establishing long term investment goals, making financial budgets and maintaining the financial performance of the organisation.

(d). Human Resource System : It deals with the maintenance and development of the workforce in the organisation. It support various activities such as identifying the potential employees, maintaining the company record of the employees of the organisation and planning different programmes for the employees to develop their talent and skills.

At the strategic level, the human resources system helps in identifying the number of employees needed to meet the organisational goals. At the management level, it helps the managers in monitoring and analyzing the recruitment process of new employees and compensation for the employees.

Q32. Explain in detail components of an Information System?

Ans. An information system is a system that accept data resources as input and processes them into information products as output. An information system depends on the resources of people (End users and Information system specialists), Hardware (Machine and Media), Software (Programs and procedures), Data (data and knowledge bases), and networks (communications media and network support) to perform input, processing output, storage and control activities that convert data resources into information products.



Thus, information system model highlights the relationships among the components and activities of information system. ***It provides a framework that emphasizes four major concepts that can be applied to all types of information systems :***

- People, hardware, software, data and networks are the five basis resources of information system.
- People resources include End users and information system specialists, hardware resources consists of machines and media, software resources includes both programs and procedures, Data resources

can include data and knowledge bases and network resources include Communications Media and Networks.

- Data Resources are transformed by information processing activities into a variety of information products for end users.
- Information processing consists of input, processing, output, storage and control activities.

1. People Resources :

People are required for the operation of all information system. These people resources include End users and Information system specialists.

(a). End users : Also called users or clients are people who use an information system or the information it produces. They can be Accountants, Salespersons, Engineers, Clerks, Customers or Managers.

(b). Information System Specialists : Are people who develop and operate information systems. They include system analysts, programmers, computer operators and other managerial, technical and clerical Information system personnel. Briefly, systems analysts design information systems, based on the information requirement of end users, programmers create computer programs based on the specification of systems analysts and computer operator operate large computer systems.

2. Hardware Resources :

The concept of hardware resources include all physical devices and material used in information processing. Specifically, it includes not only machines such as computers and other equipments, but also all data media, that is all tangible objects on which data is recorded, from sheets of paper to magnetic disks. ***Examples of hardware in computer based information systems are:***

(a). Computer Systems : Which consist of central processing unit containing micro-processors, and a variety of interconnected peripheral devices. Examples are micro-computer systems, midrange computer systems and large mainframe computer systems.

(b). Computer Peripherals : Which are devices such as keyboard, or electronic mouse for input of data and commands, a video screen or printer for output of information, and magnetic or optical disks for storage of data resources.

3. Software Resources :

The concept of Software Resources includes all sets of information processing instructions. This generic concept of software includes not only the sets of operating instructions called Program, which direct and control computer hardware but also the sets of information processing instructions needed by people, called **procedures.** ***Examples of Software Resources :***

(a). System Software : Such as an operating system program, which controls and supports the operations of a computer system.

(b). Application Software : Which are programs that direct processing for a particular use of computers by End users.

(c). Procedures : Which are operating instruction for the people who will use an information system.

4. Data Resources :

Data is more than the raw material of information system. The concept of data resources has been broadened by managers and information system professionals, They realize that data constitute organisation resource. We should view data as data resources that must be managed effectively to benefit all end users in an organisation. Data can take many forms including traditional alphanumeric data composed of other events and entities. Text data, consisting of sentences and paragraph used in written communications ; image data, such as graphic images and figures, and audio data the human voice and other sounds, are also important forms of data.

The data resources of information system are typically organised into :

(a). Databases that held processed and organised data.

(b). Knowledge bases that hold knowledge in a variety of forms such as facts, rules, and case examples about successful business practices.

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5. Network Resources :

The concept of network resources emphasizes that communication networks are a fundamental resource components of all information systems. Network resources include :

(a). Communications Media : Examples include Twisted Pair wire, Coaxial Cable, Fiber Optic Cable, Microwave Systems and Communications satellite system.

(b). Network Support : This generic category includes all of the people, hardware, software and data resources that directly support the operation and use of a communication network. Examples include communication processors such as Modems and Internetwork processors and communications control software.

Information System Activities :

1. Input of Resources : The first step in producing information in collecting and introducing data, known as input into the Information system.

A system's input are the physical object and data that cross the boundary to enter it from its environment. Data about business transactions and other events must be captured and prepared for processing by the input activity. Input devices used for entering instructions and data into computers start with a Keyboard or Mouse. For the off line inputs, information systems use predesigned forms.

For Example : For getting sales information from user, the system has prespecified performa, known as form. On a command from the user, the interfacing program presents a form on the computer screen. The data filled in the form by the user, is checked by the error detecting program in the system. On correction, only the data is entered into the file, one record for each set of data on one sale's transaction. Online or interactive input can be achieved by many methods as menus, dialog or prompt method and template method. All these methods have built in error detection and prevention provisions.

2. Processing : From the standpoint of manipulating or processing the data, the processor of the information system is the most important component. When management and system designers have established the data that will be available as inputs to an information system, and the information desired for the output, the system designers have the major project of designing the conversion process. The total process is actually made up of many small processes. **For Example** in marketing information system, the process of addition of individual sales reports into total sales is a single process among many in the system.

3. Output : It is the activity through which information is made available to the end users. An Information system produces and displays output in the format most useful to an organisation. The most widely used output device is the video display or video monitor which displays output usually. Often, information is printed on paper, which makes it a hard copy. However, computer can communicate output through speakers in the form of music or speech.

4. Storage : Computers store information on both devices that are internal to the machine and those that are external. The computer's internal memory stores data and programs while processing them. For longer shortage periods, the computer transmit data to external storage devices such as magnetic and optical disks and tapes, in a form that lets computer retrieve and process them.

5. Control : An important information system activity is the control of its performance. An information system should produce feedback about its input, processing, output and storage activities. This feedback must be monitored and evaluated to determine if the system is meeting established performance standards. Then appropriate system activities must be adjusted so that proper information products are produced for end users.

Q33. Elaborate the various issues and challenges of Information System.

Ans. The issues and challenges faced by the firms while using information system are as follows :

1. The Strategic Business Challenge :

The business representatives need vast management information to take strategic decisions in the firm. These decisions are taken within strategic business processes which changes from one instance of the process to another instance. However, the existing software development methods do not provide information system which are highly developed to support the strategic business processes. The existing software systems cannot give the required strategic information in a customized form. Thus, the managers give their input to develop software for constructing an information system, which can provide information for strategic and rapidly evolving processes. Proper techniques such as an appropriate business modelling framework, case models and visual interactive techniques are developed to help the managers. Whenever a strategic decision is made, **For Example,** venturing into new market, the business executive are provided with a documentation of the case models. Every case model has a set of software components, which provides the information needed to support a particular intervention.

2. The Globalisation Challenge :

In Earlier times, each regional office of a multinational corporation focused on solving its own unique information problems. But with the emergence of a global economy and new technology, the information system is built, which help supports both, producing and selling goods in different countries. In order to develop integrated, multinational information system, businesses must develop a common hardware, software and communication standards.

3. The Information Architecture and Infrastructure Challenge :

The information structure of the firm is of a specific form or design, which information technology caters up in a particular firm to attain the selected goals and functions. The information structure is designed for the business application systems that cater to every functional specification and level of the firm.

IT infrastructure of the firm provides the technology platform for information structure that consist of computer hardware, software, data and storage technology and networking along with the human resources required to operate the technology.

4. The Information System Ethics and Security Challenge :

Ethics is the branch of philosophy that studies value and quality of human nature. Ethics are the rules or standards governing the conduct of a person or the members of a profession. The information system ethics can be defined as moral, legal and ethical issues involved in the use of information and communication technologies. Ethics are required in information system to overcome the following issues:

(a). Privacy : Information about any person is to be safeguarded except in cases, when it may be catered to some other persons on some certain conditions. The safety conditions ensures the privacy of information to a particular person.

(b). Accuracy : It depends on the person who provides the information. A person must provide correct and authentic information. A person is accountable for any kind of error or false information published and is responsible for such conduct.

(c). Property : Information is under the proprietorship of the person who provides it. A person has the right to divide the exchange rates and other conditions for sharing the information.

(d). Accessibility : Accessibility of information depends on the extent of privacy. It determines the part and quantity of information to be catered to persons, other than the provider or owner of the information. The accessibility of information is decided by the privacy conditions so as to maintain secrecy.

5. The Information System Investment Challenge :

Investment in information system and technology must ensure significant result and improvement in performance. Performance of the system is the responsibility of management to utilise the system to achieve business results. ***The following are the features of a successful system investment:***

(a). Information is organised and managed as capital.

(b). System investments are analysed and planned as a part of improved business process.

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Q34. What IT resources are required to generate information ? "How is the effectiveness of a manager is influenced by the IT infrastructure?" Comment.

Ans. IT Resource to Generate Information :

The important IT resources to generate information are IS personnel, hardware, software, data, telecommunication networks. There are the valuable resources that must be managed by every business manager to ensure the effective use of IT for the operational and strategic benefits of a business.

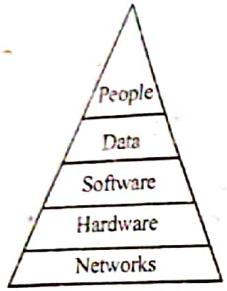

Figure : IT Resources

1. People Resources :

People are required for the operation of all information system. The people resources include end users and IS specialists.

- **End Users** (also called as users or clients) are people who use an information system or the information it produces. They can be accountants, salespersons, engineers, managers, clerks or customers etc.
- **IS Specialists :** They are those people who develop and operate information systems. They include system analysts, programmers, computer operators and other managerial, technical and clerical IS personnel.

2. Data Resources :

Data is more than the raw material of information systems. The concept of data resources has been burdened by managers and information system professionals. They realize that data is a valuable organisational resource, that must be managed effectively to benefit all end users in an organisation. Data can take many forms, it can be traditional alphanumeric data, text data consisting sentences and paragraphs used in written communications; image data such as graphic shapes and figures.

The Data Resources of Information System are Typically Organised Into :

- Databases that hold processed and organised data.
- Knowledge bases that hold knowledge in a variety of forms such as facts, rules etc.

3. Software Resources :

The concept of software resources includes all sets of information processing instructions. This generic concept of software includes not only the set of operating instructions called 'Programs' which direct and control computer hardware but also the sets of information processing instructions needed by people called 'Procedures'. Some examples of software resources are – System Software, Application Software and Procedures.

4. Hardware Resources :

The concept of hardware resources include all physical devices and materials used in processing. It includes not only machines but also includes data media, i.e., all tangible objects on which data is recorded, from sheets of paper to magnetic disks.

Examples of hardware in computer based information systems are :

(a) Computer System
(b) Computer Peripherals

5. Network Resources :

The concept of network resources emphasises that communication networks are a fundamental resource component of all information systems. Networks resources include :

- **Communication Media :** Example include twisted-pair wire, coaxial cable, fiber optic cable, microwave systems and communication satellite systems.
- **Network Support :** This generic category includes all of the people, hardware, software and data resources that directly support the operation and use of a communication network. Example include communication processors

such as modems and internetwork processors and communication control software such as network operating system and internet browser passages.

Many business executive now see IT as an enabling technology for managing the cross functional and inter-organisational processes that business units must have to successfully confront the competitive measures they face. Thus, IT has become a major force for precipitating or enabling organisation and managerial change. The internet, intranets, extranets and client/server networks, computing power and information resources are now more readily available to more manager.

Effectiveness of a Manager is influenced by the IT Infrastructure :

IT's are promoting innovative changes in managerial decision making, organisational structures and managerial work activities in companies around the world.

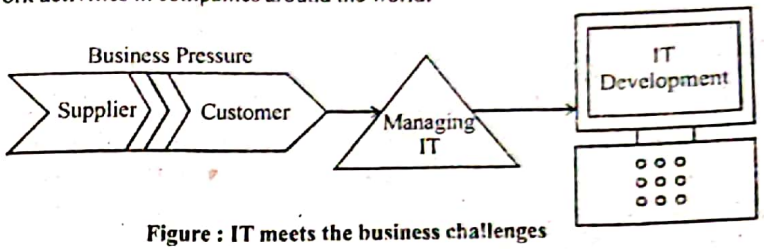

Figure : IT meets the business challenges

The decision support capability provided by IT is changing the focus of managerial decision making. The use of internet, intranets and enterprise collaboration systems to coordinate work activity is another example of impact of IT on management. Middle managers no longer need to serve as conduits for the transmission of operations feedback or control directive between operational managers and top management. Finally, IT presents managers with a major managerial challenge. Managing the information system resources of a business is no longer the sole province of IS specialists. Instead, IS management (IRM) has become a major responsibility of all managers. IT improves the throughput and efficiency of managers.

For Example :

1. Executive information systems overcome many of the objections of top executives to the lack of individual and task flexibility of previous types of management information system. Internet and intranet based business systems have also gained end user acceptance because of their easy-to-use browser based graphical interfaces.
2. IT developments such as electronic data interchange dramatically reduce the need for several departments to be involved in preparing, authorizing, checking and sending paper business documents. This can eliminate many manual task and required procedures and significantly increases manager efficiency.

Q35. Write a note on "Role of Information System in various aspects"?

Ans. Role of Information System :

Nowadays, every organisation uses Information Technology (IT). ***Following are the role of information system in various aspects :***

Widening Scope of Information Systems :

An MIS integrates business strategy, processes and the governing rules with hardware, software, database, and communication systems. If the technology or business strategies change, the MIS will also have to change. It is also important to design the system in such a way that it can adopt to changes. The

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life span of an MIS is approximately 5-10 years. An organisation usually defines its strategic goals for about five years. So, it is possible to assess the direction of change that will be required. The strategy may be to introduce a new product, increase market reach in terms of a new customer segment or new geographical area, or improve business processes to improve the quality of its products and services. The role of MIS may also change in the organisation. At first, an organisation uses IT to keep track of business transactions such as sales, purchases, salaries, etc. As the usage of the information system increases, its spread and penetration in the organisation also increases. The higher level management starts using it for strategic decision making and managing suppliers, customers and internal business processes.

Real time communication via the Intranet and Internet has increased the scope of information system's functions. A number of services and products have emerged due to the Internet Technology.

Flattening Organisations and the Changing Management Processes :

Information systems make information available to all employees but with different level of access. They are groomed and trusted to make decisions at their level using the required information. They can monitor their progress against targets using information in real time and take corrective measures or seek help if required.

IT has been instrumental in empowering employees. Management can also access information and get a consolidated picture using information system for which they had to earlier depend on the middle management. Organisation today have fewer layers of management and have therefore become flatter. The span of control and management is new across locations.

Separating Work from Location :

Employees, especially knowledge workers, can work from anywhere. Nowadays, organisations work with virtual teams. They have a very small team of just a couple of persons at the client's site to interact with the client, and the remaining team is located where it is most economical. Paperless offices are fast becoming a reality. The digital images of papers and documents are electronically filed in a database.

Recognizing Work Flows :

Since all documents are available in the electronic form, parallel processing is available. A loan application in a Bank requires about ten different people to examine it and give their feedback. A paper based sequential process takes about twenty one days whereas an electronic document with parallel processing takes one day to approve a loan.

IT had a tremendous impact on workflow in organisations. It has led to extremely efficient processes. An organisation starts out small with simple people centric and adhoc processes. As the organisation grows, the processes also grows but in an adhoc manner. These processes are often inefficient and do not integrate well with other functional units in the organisation. IT provides an opportunity to organisations to critically evaluate their processes and improve them.

Increasing Flexibility of Organisations :

Flexible manufacturing and mass customization have been possible due to information technology. IT helps organisation collect data on changing market trends and requirements, analyse data and often customize products on a Mass scale. Information systems have added flexibility to manufacturing and production processes. Inventory purchase and production schedules can today be fine tuned to customer requirements. Customised products and solutions can target specific market segments. This kind of marketing is known as 'Micro Marketing'.

Redefining Organisational Boundaries : New avenues for collaboration

Networks and IT have made organisational boundaries less rigid. E-Commerce has integrated financial institutions seamlessly with buyers and sellers. Lead times and transaction costs have come down and cash flows have improved.

Q36. Explain the paradigm shift on changing role of Information System in an Organisation.

Ans. Information system is vital, as it helps to manage the day to day activities and taking critical decisions of an organisation. Information is used in the decision-making process of an organisation to achieve the organisational goals.

An organisation can influence the various ways of information technology that can be used in the decision making process. The IT infrastructure is designed to allow the information flow across the enterprise. It includes links to the customers, vendors and Internet.

The organisational unit is responsible for providing technology related services is called the information system department. It is responsible for maintaining the hardware, software, data storage and networks that comprise the IT infrastructure of the organisation. This departments include programmers, system analysts, project leaders and managers of information system and a chief information officer who heads it.

The information system affect the finances and working environment of organisations.

The following are the impacts of information system in an organisation :

1. Economic Impacts
2. Organisational Behaviour Impacts

1. Economic Impacts :

Implementation of IT in an organisation has resulted in the decrease in the number of employees. IT is slowly substituting other capital forms such as building and machinery and thus reducing the expenditure of the organisation. No organisation is self sufficient, so when an organisation takes over another, it tries to reduce the transaction cost. The cost that is required for transaction is called the transaction cost. Traditional market system is expensive, as it has to deal with a distant supplier, take care of insurance and travel to obtain information about the required products. IT can reduce the transaction cost by getting into contracts with suppliers for getting their supply of products.

Reduction in management cost enables the firms to increase the revenue. IT has reduced the cost and shifted the transaction cost curve inwards as shown. Thus, it opens up the possibility of revenue growth without increasing the firm size in an organisation.

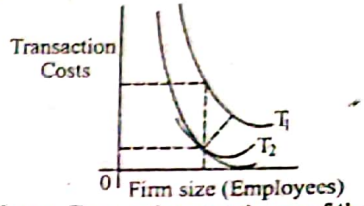

Figure : Transaction cost theory of the Impact of IT on the organization

The information technology also helps in reducing the cost incurred while communicating within an organisation with the growth of the firm, several expenditures such as agency costs and coordination cost rise because, the owner has to spend more money to supervise and manage the employees.

According to **Agency Cost Theory,** the firm is viewed as a 'Nexus of Contract' among self interested individuals rather than a unified, profit maximizing entity.

As firm grows in size and complexity, the agency cost rises because the owner must apply more efforts to supervise and manage the employees. This phenomenon is shown in the figure, where IT has shifted the agency curve down to the right, which enables the firms to expand while lowering the agency costs.

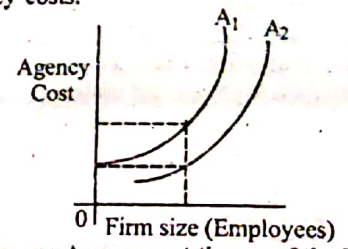

Figure : Agency cost theory of the Impact of IT on the organization

2. Organisational and Behavioural Impacts :

The following are the impacts of IT on organisation:

(a). Flattened Organisations : IT has changed the organisational structure to flattened organisation.

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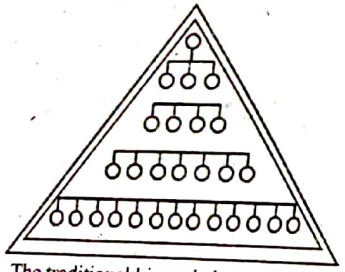
A flattened organisation provides the lower level employees with more knowledge. The managers takes less time to reach a decision as they obtain the correct information on time. So, the flattened organisation needs less number of managers. The traditional organisations were not efficient and were invert to changes.

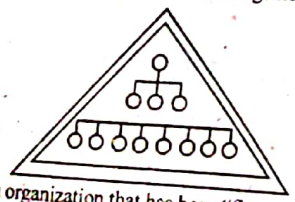
To meet the present day needs, the traditional organisations have reduced the number of employees and the number of levels in organisational hierarchies.

(b). Emergence of virtual firms : These firms are not restricted to any geographical boundary and are connected to its employees, managers, customers, suppliers and assets by telecommunication networks.

For Example : Gyan Ganga Publications can sell books directly to the customers. This organisation receives orders through telephone calls or through their website. IT has changed the way of handling, evaluating and analyzing the data related to an organisation.



The traditional hierarchal organization with many levels of management



An organization that has been "flattened" by removing layers of management

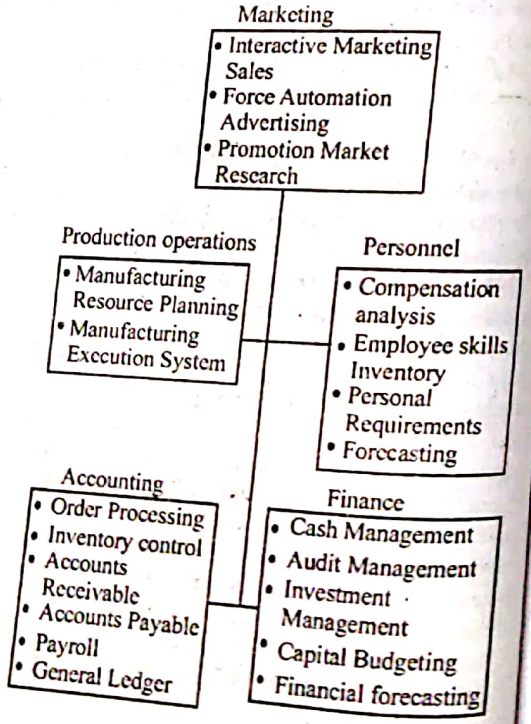
Flattened Organizations

(c). Increasing flexibility of Organisation : IT had made the firms more flexible, as they can reacts quickly to the changing needs of the market and the customers.

Information technology has changed the hierarchy of decision making process in an organisation. Behavioural researches have observed that IT could change the hierarchy of decision-making process in organisations, by lowering the costs, information acquisition and broadening the distribution area of information. Information technology could bring information directly from the operating units to senior managers, thereby eliminating middle level Managers and their clerical workers.

Q37. List the application areas of Information System. Explain the efficiency and effectiveness criterion in information system.

Ans. There are many application areas which implement information system in an organisation to solve the business problems and to pursue business opportunities. ***The various applications areas of information systems can be shown diagrammatically as :***



The particular efficiency and effectiveness criterion in information system can be summarised as :

1. More Efficient and Effective Corporate Planning : Planning a MIS forces the Management to evaluate it needs, resources and problem. The MIS planning and implementation stage should accomplish the following :-

(a) Enable the company to divide where it is now and where it wants to be at certain time in the future.

(b) Redefine the real problem of the organisation and how to use the information system to solve them.

(c) Eliminate inefficient policies and procedures.

(d) Redesign organisational reporting responsibility.

(e) Enables the operating department to be more aware of the goals and actions of all their departments.

2 Improve Communication throughout the organisation : Planning and information system initially requires the firms to determine its critical goals and objectives from the definition stage, the firm then must outline the data that are necessary to evaluate the organisation's position in relation to in goals to particular points in time. To perform these tasks, the top management must be involved in and initiated planning process from its level down to the operating levels of the organisation.

3. Values from Independent Consultant : When the experience and training of outside consultants are properly utilised their experts can provide important advantages in developing information systems. Independent consultants are able :

(a) To provide the initial feedback as how the company currently operates and uncover problems.

(b) To recommend the steps to be taken in planning and designing the problems. The discussion should be with the company's system committee.

(c) To be responsible for the organisation, the system's analysis and the feasibility studies relating to the data processing equipments that would be repaired.

4. Streamlined Information Requirements : When the goals are defined and the data to support the goals agreed upon, management usually disovers that information requirements are reduced and compared to the solution which previously existed.

Planning and design of the information, therefore, after becomes a tool for eliminating unnecessary and wasteful practices that drain company's resources.

5. Quicker Response time and their Internal Control : A well organised MIS allows management to be flexible in reaction to the day to day need of the organisation for purpose of critical analysis, planned information can adjust to the changing demand of the management.

When properly organised and managed the information system can sense as an extremely useful tool to perform organisation more efficiently and effectively as a whole.

Q38. What is meant by the word 'system'? Discuss different kinds of system?

Ans. System :

The term system is derived from the Greek word **systema**, which means an organized relationship among functioning units or components.

"A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective".

The word **component** may refer to physical parts (engines, wings of aircraft, wheels of a car), managerial steps (planning, organizing, directing, and controlling), or a subsystem in a multilevel structure. The components may be simple or complex, basic or advanced.

There may be a single computer with a keyboard, memory and printer, or a series of intelligent terminals linked to a mainframe.

Here, each component is part of the total system and has to do its share of work for the system to achieve the intended goal. A system exists, because it is designed to achieve one or more objectives.

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Different Kinds of Systems :

1. Abstract and Physical System : System can be categorised as abstract systems and physical systems. An abstract or conceptual system is an orderly arrangement of interdependent ideas or constructs which may or may not have counterpart in the real world. **For Example,** a system of theology is an example of abstract system, which is an orderly arrangement of ideas about God and the relationship of humans to God.

On the other hand, physical systems are generally concrete operational systems made up of People, Materials, Machines, Energy and other physical things. Physical systems are more than conceptual constructs, they display some activity or behaviour. The elements in such a system interact to achieve a common objective.

2. Deterministic and Probabilistic Systems : A deterministic system is one in which the occurrence of all events is known with certainty. In such a system, given a description of the system state at a particular point of time of its operation, the next state can be perfectly predicted. An example of such a system is a correct computer program which performs exactly according to a set of instructions.

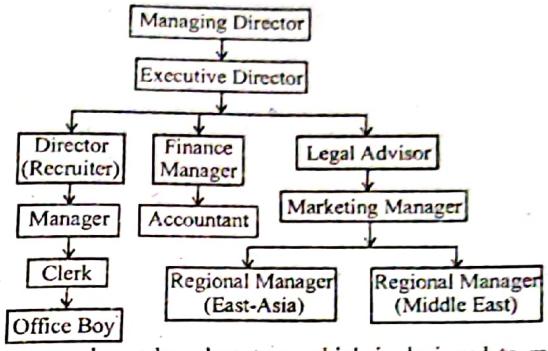
A probabilistic system is one in which the occurrence of events cannot be perfectly predicted. Though the behaviour of such a system can be described in terms of probability, a certain degree of error is always attached to the prediction of the behaviour of the system. An example of such a system is a set of instructions given to a person who may not follow the instructions exactly as given.

3. Open and Closed Systems : An open system is one that interacts with its environment and thus exchanges information, material or energy with its environment, including random and undefined inputs. Open systems are adaptive in nature as they tend to react with the environment in such a way, so as to favour their continued existence. Such systems are 'self organizing' in the sense that they change their organisation in response to changing conditions. All organisations essentially are open systems as they cannot work in isolation.

A closed system is one which does not interact with its environment. Such systems in business world, are rare, but relatively closed systems are common. Thus, the system that are relatively isolated from the environment but not completely closed, are termed as closed systems. **For Example,** a computer program is a relatively closed system because it accepts and process previously defined inputs and provides output too in previously defined way. In other words, we may say that a relatively closed system is one which controls its inputs, and outputs and is protected from the environment disturbances.

4. User Machine Systems : Most of the physical systems are user machine (or human machine) systems. It is difficult to think of a system composed only of people who do not utilise component of some kind to achieve their goals. In user machine systems, both ie. human as well as machine perform some activities in the accomplishment of a goal (i.e. decision making). The machine elements (may be computer hardware and software) are relatively closed and deterministic whereas the human elements of the system are open and probabilistic. For instance, in a system, the computer plays a major role and human simply monitors the machine operation. At the other extreme, the machine performs a supporting role while the humans performs the significant work.

5. Formal and Informal System : A formal system represents the hierarchy of the organisation in the form of organisation chart that help understand the structure of the organisation. The organisation chart represents the relationship among the various levels of management in the form of boxes and straight lines. The boxes represent various managerial levels and the straight lines connecting the boxes, representing the relationship between the various managerial levels. It is concerned with the pattern of authority, communication and workflow.



Informal system is an employee based system, which is designed to meet the personal and vocational needs of the employees. It also helps in identifying and solving the work related problems of employee. **For Example,** various groups formed in the organisation based on the same interests such as the same residential area and the same department, can form an informal system.

Q39. How would you distinguish between decomposition of a system and integration of subsystem ? Discuss.

Ans. Decomposition of a System :

Decomposition of a system refers to the division of the system into various subsystems. It allows us to perform complex tasks with greater ease. Moreover, the division of system into various subsystem lead to the hierarchical representation of the operations. A system is divided into smaller units until the smallest unit of the system becomes manageable at the system level.

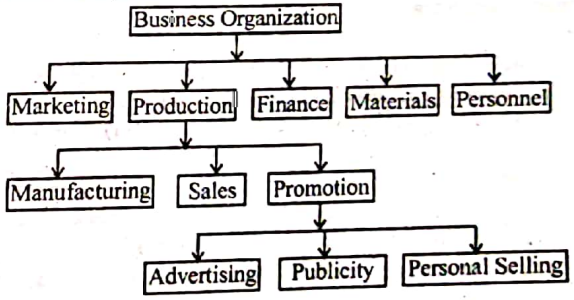


Figure: Decomposition of a Business Organization

The decomposition of a system can be best examplified by the hierarchical arrangement of various departments in an organisation. Consider the example of an organisation where multiple units integrate with each other to achieve a common objective. In such organisation, the system is decomposed into various departments such as marketing, finance, production, materials and personnel. The production department is further categorised into various departments such as manufacturing, sales and promotion. The task assigned to the promotion department can be further divided into different sub departments such as advertising, publicity and personnel selling.

The process of decomposition helps to identify and separate the subsystems that can work independently in a system and decouple them to achieve efficient results. Decoupling refers to the phenomenon in which the interaction between sub systems and other elements of the system disappears.

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It allows the sub system to function independently. It helps in minimizing the adverse effects of a system on another sub systems.

Integration :

A system is decomposed into smaller systems for better management at the operational level. However, to achieve the common objective of an organisation, there is a need to integrate all the subsystems of an organisation. The collection of output from all the subsystems to produce the desired output is called integration of the subsystems. This allows us to treat the whole organisation as a single unit, dedicated to perform an operation.

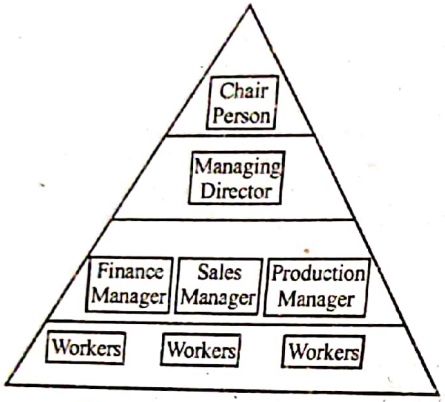


Figure : Integration of a System

Q40. What is Systems Analysis?

Ans. **Systems Analysis :**

Systems analysis is the study of sets of interacting entities, including computer systems analysis. This field is closely related to requirements analysis or operations research. It is also "an explicit formal inquiry carried out to help someone (referred to as the decision maker) identify a better course of action and make a better decision than he might otherwise have made."

The terms analysis and synthesis come from **Greek** where they mean respectively "to take apart" and "to put together". These terms are used in scientific disciplines from mathematics and logic to economics and psychology to denote similar investigative procedures. Analysis is defined as the procedure by which we break down an intellectual or substantial whole into parts. Synthesis is defined as the procedure by which we combine separate elements or components in order to form a coherent whole. Systems analysis researchers apply methodology to the analysis of systems involved to form an overall picture.

System Analysis is used in every field where there is a work of developing something. Analysis can also be defined as a series of components that perform organic function together. —in computer world, in this stage a statement of the problem is formulated and a model is build by the analyst in encouraging real-world situation. This phase show the important properties associated with the situation. Actually, the analysis model is a concise, precise abstraction and agreement on how the desired system must be developed. The objective is to provide a model that can be understood and criticized by any application experts in the area whether the expert is a programmer or not.

System analysis is not a preliminary study. It is an in-depth study of end user information needs that produces functional requirements that are used as the basis for the design of a new information system.

System analysis traditionally involves a detailed study of :

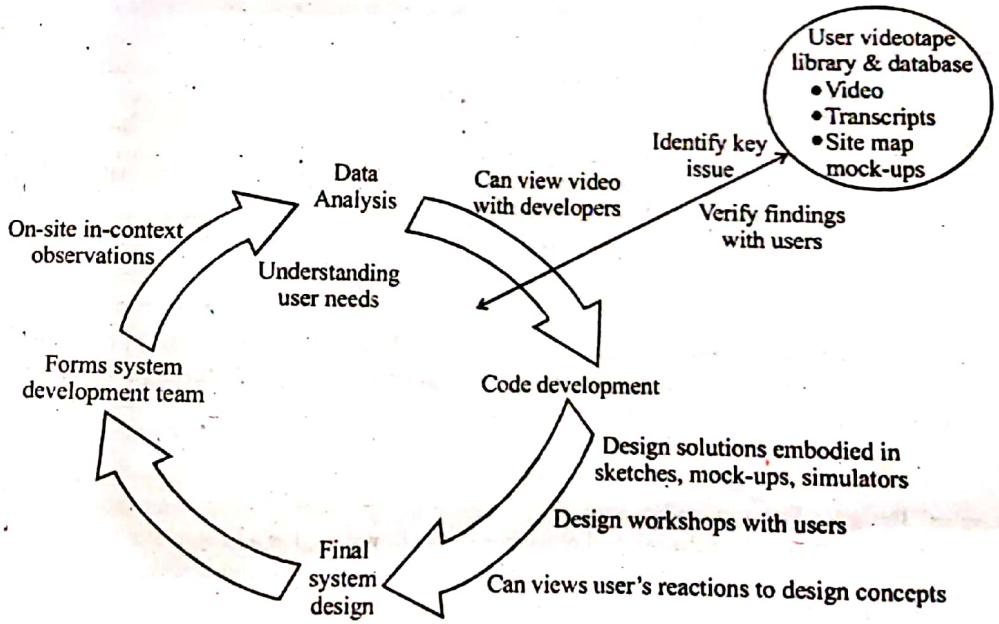
- The information needs of the organisation and end user.
- The activities, resources, and products of any present information system.
- The information system capabilities required to meet our information needs and those of other end user.

1. Organisational Analysis : It is an important first step of system analysis. How can anyone improve an information system if they know very little about the organisational environment in what that system is location? They can't, that's why the members of development team have to know something about the organisation, its management structure its people, its business activities, the environmental system, must deal with, and its current information system.

2. Analysis of the Present System : Before we design a new system, it is important to study the system that will be improved or replaced (if there is one). We need to analyze how this system uses hardware, software, network, and people resources to convert data resources, such as transactions data, into information products, such as reports and displays.

3. Functional Requirement Analysis : This step of system analysis is one of the most difficult. We may need to work as a team with system analyst and other end users to determine our specific business information needs. Functional requirements are end user information requirements that are not tied to the hardware, software, network, data and people resources that end user presently use or might use in the new system.

Examples of some of the activities that can be involved in analyzing a system and designing improvements.



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Q41. What do you understand by system design? What are the phases involved in development of design?

Ans. System Design :

System Design is the most creative and challenging phase of the system life cycle. It describes the fi system and the process by which it is developed. The input to this phase are functional specifications the system and details about the computer configuration. This phase begin from the objectives of system i.e. information requirement of users.

System design is a solution, a 'how to' approach to the creation of a new system. It provides understanding and procedural details necessary for implementing the system recommended in feasibility study. The emphasis is on translating the performance requirements into design specifications

System analysis describes what a system should do to meet the information needs of users while System designs specifies how the system will accomplish this objective. System design consists of desig activities that produce system specification satisfying the functional requirement developed in the system analysis stage.

System design consist of three activities : user interface, data and process design.

1. **User Interface Design :** This activity focuses on supporting interactions between end users and their computer-based applications. Designers concentrate on the design of attractive and efficient forms of user input and output such as easy-to-use internet or intranet.
2. **Data Design :** The data design activity focuses on the design of the structure of databases and files to be used by a proposed information system.
3. **Process Design :** The process design activity focuses on the design of software resources that is the programs and procedures needed by the proposed information system.

Examples of userface design elements that could be used in designing multimedia web pages on internet or intranet websites.

Look	Design Elements
Corporate	Background of marble or granite and embossed or carved graphics.
Hip/young	A lot of color, trendy icons, animation, and sound.
Innovative/creative	Independent graphics that form a cohesive whole even though that appear to float separately from one another.
Aggressive	Action images-people moving, salespeople interacting with customers, contracts being signed.
Family-oriented	Images of people

The design phase is a transition from a user-oriented document (system proposal) to a document oriented to the programmers or database personnel. ***System design goes through two phases of development :***

- Logical Design
- Physical Design

Logical Design : For a candidate system, the logical design describes the input (source), outputs (destination), databases (data stores), and procedures (data flows) – all in a format that meets the user's requirements. A data flow diagram represents the logical flow of a system and defines the boundaries of the system. When analysts prepare the logical system design, they specify the user needs at a level of detail that virtually determines the information flow in and out of the system and the required data resource.

Physical Design : Following logical design is physical design. It produces the working system by

defining the design specifications, that tell programmers exactly, what the candidate system must do. In turn, the programmer writes the necessary programs or modifies the software package that accepts input from the user, performs the necessary calculation through the existing file or database; produces the report on a hard copy or displays it on a screen and maintains an updated database at all times.

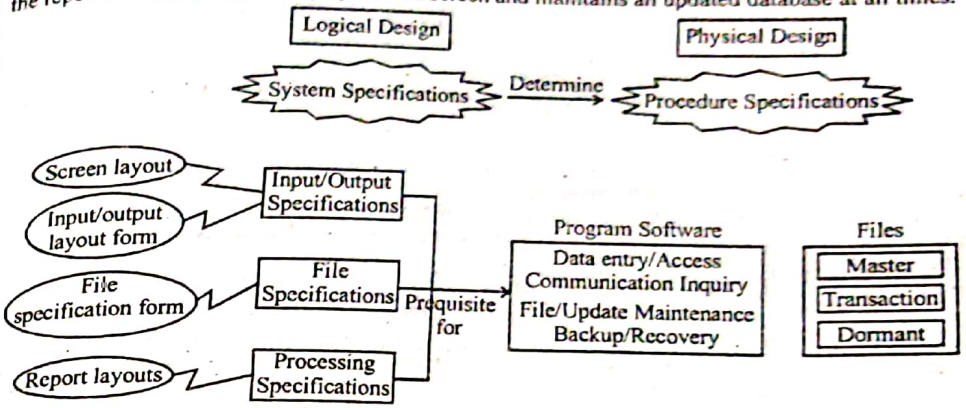

Figure : System Design goes through Logical & Physical Design

Q42. Describe the process of system design in detail.

Ans. System Design is a transition from a user-oriented document to a document oriented to programmers or data-base personnel. It goes through logical and physical design with emphasis on the following :

(a). Preparing input/output specifications,
(b). Preparing security and control specifications,
(c). Specifying the implementation plan,
(d). Preparing a logical design walkthrough before implementation.

Structured Design is a data-flow based methodology that identifies inputs and outputs and describes the functional aspects of the system. It partitions a program into a hierarchy of modules organized in a top-down manner with the details at the bottom. A useful activity in all phases of a structured project is the walkthrough, where ideas are interchanged among peers. User involvement is extremely important.

The major development activities during structured design are database design, implementation planning, system test planning, system interface specifications and user documentation. Much of the document is written after conversion, a task that follows design. A well-designed system should provide for controls to eliminate errors, check fraud and ensure system integrity. Audit trails, documentation and processing control must be incorporated into the system before it is released to end user.

System Design Steps :

System sizing and design can be broken down into a number of logical steps, which are :

1. Output Design : The output design should be able to communicate information to the users in the organization effectively. The information, as an output, can be printed, displayed or stored.

2. Input Design : In this phase the designer task is to identify those data items that will be an input to the system. The designer finds a linkage to the input data to form the output.

3. Processing Design : After the output and the input design, the designer has to develop a process design which will specify the various steps that will convert input data into outputs.

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The process design deals with the following two types of processes, viz ; computing and d... making.

4. Data Specifications : Having identified data items at atomic level and configuring them into a... form a record of an items entity, it is necessary to design specifications for each data item. The specif... is expressed in terms of length of an item in terms of characters, its nature in terms of numeric or a... numeric known as picture. The specifications are used for error checking, control and processing.

5. Procedure Design : This phase specifies how the computer system will function from data e... to the output stage. The procedure indicates the logic of data processing and the flow of system co... from one step to the other.

Steps in Procedure Design :

Steps	Explanation	Comment
Data entry of the transactions, master data.	A simple data entry as per the simple data entry as per the input design specification.	Provides the data entry programmes fo... all the documents considered in th... system.
Data validation	The data entry is validated as per the input picture specification and control specification.	Shows the errors of presence an... absence of the data entity and an... violation of given specifications.
Transaction Validation	Validates the transactions for its type and for its internal consistency.	Shows the wrong type of transactio... entering in the system and the mistak... in the documentation or in the transaction.
Edit and update	The errors and new data to be updated to complete the records.	Helps to correct the data at all the levels.
Data processing	Shows at each stage the process and the activities such as sort, merge, collate and computer. It also shows the use of files and creation of new files and its further use in the system.	Helps to understand the step by step development of system processing.
Output processing	Show whether the output is printed, displayed and stored. Shows the device on which the output is processed.	Helps to understand how the output is produced.

Q43. What is the meaning of Detailed System Design of an MIS? What are its Aims?

Ans. After the scope and general configuration of the MIS have been establishing, the concept o... Detailed Design is needed. Thus the procedure for Detailed System Design which may suit to all form... of business organisation be generated. The reality is that no such procedure or system cannot be formulate... which may suit to all forms of business. **There are some basic reason for it listed as :**

1. There is a wide variety of approaches to system design in terms of organization for it, conducting it... and defining its output.
2. A basic question deals with the state of the art and to what extent it should be incorporated into... systems design. In other words, should we describe management information system design as it is... today, as it could be if the latest of the art knowledge were utilized, or as it probably will be in five... years?
3. It is difficult to describe a process of rational design that must be tested in an organization from time... to time, determine the likelihood of its being accepted by the members of the organization. That is... the design of a management information system is both a rational and a social process.
4. If it is to represent the design of information system in general. The explanation may be at such a...

level of generality that it gives on clues to the multitude of detailed steps involved. On the other hand, the explanation of a detailed procedure can describe only one among thousands and gives no clue to the general nature of design. Attempting to find a middle course sacrifices the advantage of one extreme without gaining much from the other.

5. An explanation of detailed system design procedure must be interrupted frequently by descriptive essays on some aspect with which the designer deals.

Within the limitations on clarity and objectives imposed by these considerations, one will attempt to present the nature of systems design at the "edge of the art". The edge of the art is broad, with part in the present and part in the near future. A general approach will provide the framework, but frequent resort to detailed procedures and descriptions will bring substance to the framework.

Inform and Involve the Organization : The first step in systems design is concerned with gaining support for the work that follows. System designers must have the support of most members of the organization to obtain information for the design of the system and to obtain acceptance of the final system. At a minimum, members of the organisation should be informed of the objectives and nature of the study. It is preferable, if possible, to draw many members into the study, at least in some small way. Furthermore, it is desirable to reassure the employees, if possible, that changes, will benefit them or that they will not suffer financially from implementation of the system.

The employees should not be disturbed during the system design can be quiet hazardous. When people are not informed, they seize upon bits of information, construct concepts that may be completely erroneous, and as a consequence often take up detrimental activities. The final system, when announced, may be met with shock, resentment, and both open and convert resistance.

Aim of Detailed Design :

The following are the main aims of detailed design:

1. Related to Operating System : The detailed design of an MIS is closely related to the design of operating systems. Sometimes, it is true, the operating system must be accepted without change and a new MIS appended to it. However, it is preferable to design both systems together.

2. Meaning of Detailed Design : By drawing upon the analogy of engineering design, one can clarify the meaning of detailed design. The direct goal of engineering design is to furnish the engineering description of a tested and producible product. Engineering design consist of specification in the form of drawing and specification reports for systems as a whole and for all components in the system. Further, justification documents in the form or reports of mathematical analysis and test results are part of the detailed design. Enough detail must be given so that shop to construct the product. The production of operating and maintenance instructions is also considered part of the design output.

3. Description : The aim of the detailed design is to furnish a description of a system that achieve the goals of the conceptual system design requirements. This description consists of drawings, flowcharts, equipment and personnel specifications, procedures, support tasks, specification of information files, and organization and operating manuals required to run the system. Also part of the design is the documentation of analysis and testing which justifies the design.

4. Role of Personnel Management : The design must be sufficient detailed that operating management and personnel can implement the system. Whereas conceptual design gives the overall performance specifications for the MIS, the detailed design yields the constructions and operating specifications.

Q44. Explain project management of MIS detailed design.

Ans. Project Management of MIS Detailed Design :

Any effort that qualifies as a system design has the dimensions of a project. The first step in the detailed design is therefore a planning and organization step. Often, in large projects, not

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The process design deals with the following two types of processes, viz ; computing and making.

4. Data Specifications : Having identified data items at atomic level and configuring them into form a record of an items entity, it is necessary to design specifications for each data item. The specification is expressed in terms of length of an item in terms of characters, its nature in terms of numeric or numeric known as picture. The specifications are used for error checking, control and processing.

5. Procedure Design : This phase specifies how the computer system will function from data to the output stage. The procedure indicates the logic of data processing and the flow of system from one step to the other.

Steps in Procedure Design :

Steps	Explanation	Comment
Data entry of the transactions, master data.	A simple data entry as per the simple data entry as per the input design specification.	Provides the data entry programme all the documents considered in system.
Data validation	The data entry is validated as per the input picture specification and control specification.	Shows the errors of presence absence of the data entity and violation of given specifications.
Transaction Validation	Validates the transactions for its type and for its internal consistency.	Shows the wrong type of transaction entering in the system and the mistake in the documentation or in transaction.
Edit and update	The errors and new data to be updated to complete the records.	Helps to correct the data at all levels.
Data processing	Shows at each stage the process and the activities such as sort, merge, collate and computer. It also shows the use of files and creation of new files and its further use in the system.	Helps to understand the step by step development of system processing.
Output processing	Show whether the output is printed, displayed and stored. Shows the device on which the output is processed.	Helps to understand how the output produced.

Q43. What is the meaning of Detailed System Design of an MIS? What are its Aims?

Ans. After the scope and general configuration of the MIS have been establishing, the concept of Detailed Design is needed. Thus the procedure for Detailed System Design which may suit to all forms of business organisation be generated. The reality is that no such procedure or system cannot be formulated which may suit to all forms of business. **There are some basic reason for it listed as :**

1. There is a wide variety of approaches to system design in terms of organization for it, conducting and defining its output.
2. A basic question deals with the state of the art and to what extent it should be incorporated in systems design. In other words, should we describe management information system design as it today, as it could be if the latest of the art knowledge were utilized, or as it probably will be in five years?
3. It is difficult to describe a process of rational design that must be tested in an organization from time to time, determine the likelihood of its being accepted by the members of the organization. That is the design of a management information system is both a rational and a social process.
4. If it is to represent the design of information system in general. The explanation may be at such level of generality that it gives on clues to the multitude of detailed steps involved. On the other hand, the explanation of a detailed procedure can describe only one among thousands and gives no clue to the general nature of design. Attempting to find a middle course sacrifices the advantage of one extreme without gaining much from the other.
5. An explanation of detailed system design procedure must be interrupted frequently by descriptive essays on some aspect with which the designer deals.

Within the limitations on clarity and objectives imposed by these considerations, one will attempt to present the nature of systems design at the "edge of the art". The edge of the art is broad, with part in the present and part in the near future. A general approach will provide the framework, but frequent resort to detailed procedures and descriptions will bring substance to the framework.

Inform and Involve the Organization : The first step in systems design is concerned with gaining support for the work that follows. System designers must have the support of most members of the organization to obtain information for the design of the system and to obtain acceptance of the final system. At a minimum, members of the organisation should be informed of the objectives and nature of the study. It is preferable, if possible, to draw many members into the study, at least in some small way. Furthermore, it is desirable to reassure the employees, if possible, that changes, will benefit them or that they will not suffer financially from implementation of the system.

The employees should not be disturbed during the system design can be quiet hazardous. When people are not informed, they seize upon bits of information, construct concepts that may be completely erroneous, and as a consequence often take up detrimental activities. The final system, when announced, may be met with shock, resentment, and both open and convert resistance.

Aim of Detailed Design :

The following are the main aims of detailed design:

1. Related to Operating System : The detailed design of an MIS is closely related to the design of operating systems. Sometimes, it is true, the operating system must be accepted without change and a new MIS appended to it. However, it is preferable to design both systems together.

2. Meaning of Detailed Design : By drawing upon the analogy of engineering design, one can clarify the meaning of detailed design. The direct goal of engineering design is to furnish the engineering description of a tested and producible product. Engineering design consist of specification in the form of drawing and specification reports for systems as a whole and for all components in the system. Further, justification documents in the form or reports of mathematical analysis and test results are part of the detailed design. Enough detail must be given so that shop to construct the product. The production of operating and maintenance instructions is also considered part of the design output.

3. Description : The aim of the detailed design is to furnish a description of a system that achieve the goals of the conceptual system design requirements. This description consists of drawings, flowcharts, equipment and personnel specifications, procedures, support tasks, specification of information files, and organization and operating manuals required to run the system. Also part of the design is the documentation of analysis and testing which justifies the design.

4. Role of Personnel Management : The design must be sufficient detailed that operating management and personnel can implement the system. Whereas conceptual design gives the overall performance specifications for the MIS, the detailed design yields the constructions and operating specifications.

Q44. Explain project management of MIS detailed design.

Ans. Project Management of MIS Detailed Design :

Any effort that qualifies as a system design has the dimensions of a project. The first step in the detailed design is therefore a planning and organization step. Often, in large projects, not

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enough is known about the prospective system in advance of the conceptual design to plan for the detailed design project. Further, if the conceptual design indicated that a new system design is not appropriate at this time, any project planning for the detailed design in advance would be wasted.

Once the project manager and key project personnel have been designated, the steps in project management fall into two classes; planning and control. The amount of effort expended in each step is obviously a function of the size of the MIS project and the cost of developing the detailed design of the project.

Project Planning :

Project planning is needed for the following :

1. **Establish the project objectives :** This involves a review, subdivision, and refinement of the performance objectives established by the conceptual design.
2. **Define the project tasks :** This identifies a hierarchical structure of tasks to be performed in the design of the MIS and may be documented by work package instruction for large projects.
3. **Plan the logical development of sequential and concurrent tasks and task activities :** This usually requires a network diagram of events and activities.
4. **Schedule the work as required by management :** Establishing end date and activity network constraints. Essentially, the work and schedule are tied together by completion of the PERT diagram.
5. **Estimate labour,** equipment, and other costs for the project.
6. Establish a budget for the project by allocating funds to each task and expenditures month by month over the life of the project.
7. **Planning and staffing** of the project organisation over its life.

Project Control :

1. Determine whether project control objectives are being met as the project progress.
2. Maintain control over the schedule by changing work loads and emphasis as required by delay in critical activities.
3. Evaluate expenditure of funds in terms of both work accomplished and time. Revise the budget as required to reflect changes in work definition.
4. Evaluate work force utilization and individual work progress, and make adjustments as required.
5. Evaluate time, cost, and work performance in terms of schedules, budgets and technical plans to identify interaction problems.

Identify Dominant and Trade-Off Criteria :

Dominant criteria for a system are those that make an activity so important that it overrides all the activities. **For Example,** A dominate criterion might be that the system operate so that there is never a stock out. This overrides the criteria of minimizing inventory cost. Such a criterion might hold for a company selling human blood, life preserving drugs, or electric power. It might even hold for a company selling a consumer product where loss of a customer is permanent and all competitors have a no-stock out policy.

Examples of other dominant criteria might be one-day customer service, zero-defect product, specified price range for product, maintenance of multiple sources of supply for all materials and components purchased, or conformity of all research and engineering to long-range corporate plans. It is obvious that identification of the dominant criteria is necessary before subsequent design steps can proceed.

Trade off criteria are those in which the criteria for performance of an activity may be reduced to increased performance of another activity. **For Example,** The criteria of low manufacturing costs might be balanced against that of long-range public image of the firm achieved by reduction in environmental pollution. Again, the criterion of producing styles or models for many segments of the market might be balanced against that of maintaining low manufacturing and service costs.

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Unit - V

5 Decision Support System

SECTION - A
Very Short Answer Questions
(3 Marks Each)

Q1. What is DSS ?

Ans. Decision Support System :

- Decision-making activities that supports business or organizational decision making.
- DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance.

Typical information that a decision support application might gather and present are:

- Inventories of information assets (including legacy and relational data sources, cubes, data warehouses, and data marts),
- Comparative sales figures between one period and the next,
- Projected revenue figures based on product sales assumptions.

One example is the clinical decision support system for medical diagnosis. Other examples include a bank loan officer verifying the credit of a loan applicant or an engineering firm that has bids on several projects and wants to know if they can be competitive with their costs.

DSS is extensively used in business and management. Executive dashboard and other business performance software allow faster decision making, identification of negative trends, and better allocation of business resources.

Q2. What is TPS ?

Ans. Transaction Processing System :

A transaction processing system is a type of information system. TPSs collect, store, modify, and retrieve the transactions of an organization.

A transaction is an event that generates or modifies data that is eventually stored in an information system.

To be considered a transaction processing system the computer must pass the ACID test. The essence of a transaction program is that it manages data that must be left in a consistent state. For example, if an electronic payment is made, the amount must be both withdrawn from one account and added to the other; it cannot complete only one of those steps.

Q3. What is ERP ?

Ans. Enterprise Resource Planning :

Enterprise resource planning (ERP) integrates internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, CRM, etc. ERP systems automate this activity with an integrated software application. Its purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. ERP systems can run on a variety of hardware and network configurations, typically employing a database to store data.

ERP systems typically include the following characteristics:

- An integrated system that operates in real time (or next to real time), without relying on periodic updates.
- A common database, which supports all applications.
- A consistent look and feel throughout each module.
- Installation of the system without elaborate application/data integration by the Information Technology (IT) department

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Q4. What is Expert systems?

Ans. Expert System :

In artificial intelligence, an **expert system** is a computer system that emulates the decision-mak ability of a human expert. Expert systems are designed to solve complex problems by reasoning ab knowledge, like an expert, and not by following the procedure of a developer as is the case in conventio programming. The first expert systems were created in the 1970s and then proliferated in the 19 Expert systems were among the first truly successful forms of AI software.

An expert system has a unique structure, different from traditional programs. It is divided into tw parts, one fixed, independent of the expert system: the inference engine, and one variable: the knowled base. To run an expert system, the engine reasons about the knowledge base like a human. In the 80's third part appeared: a dialog interface to communicate with users. This ability to conduct a conversati with users was later called "conversational".

Q5. What is GDSS ?

Ans. Group Decision Support System (GDSS) are computer based information systems that facilita the free flow and exchange of ideas and information among group members while maintaining the anonymity. Groups typically consists of less than 20 people, who arrive at decision through communicatio The communication serves to share information and implement the decision taking process. The decisio may be taken by vote but is more often by negotiation, consensus and preferences ranking.

SECTION - B
Short Answer Questions
(7.5 Marks Each)

Q6. What are Decision Support System? List some attributes and characteristics of DSS.

Ans. Decision Support System :

DSS are designed to be adhoc, quick-response systems that are initiated and controlled by busines decision makers. Decision support systems are able to support directly the specified types of decision and the personal decision-making styles and needs individual executives, managers, and busines professionals.

DSS is, an interactive software based system, intended to help decision makers compile useful information from raw data, documents personal knowledge, and / or business models to identify and solve problem and make decisions.

DSS systems are helpful where the decision maker calls for complex manipulation of data and use several methods to reach an acceptable solution using different analysis approach. The DSS helps i making a decision and also in performance analysis. DSS can be built around the rule in case o programmable decision situation. The rules are not fixed or predetermined and requires every time the user to go through the decision making cycle.

Attributes of DSS :

1. DSS should be adaptable and flexible.
2. DSS should be interactive and provide ease of use.
3. Effectiveness balanced with efficiency (benefit must exceed cost).

4. Complete control by decision-makers.
5. Ease of development by (modification to suit needs and changing environment) end users.
6. Support modeling and analysis.
7. Data – access.
8. Standalone, integration and web-based.

Characteristics of DSS :

1. Support for decision makers in semi structured and unstructured problems.
2. Support managers at all levels.
3. Support individuals and groups.
4. Support for interdependent or sequential decisions.
5. Support intelligence, design, choice, and implementation.
6. Support variety of decision processes and styles.

Example : DSS would interactively show a sales manager the effects on sales performance of changes in a variety of factors (e.g., promotion expense and salesperson compensation). The DSS could then use several criteria (e.g., expected gross margin and market share) to evaluate and rank alternative combinations of sales performance factors.

Q7. Discuss the different types of DSS.

Ans. The different types of decisions support systems are as follows :

(a) Status Inquiry Systems : The number of decision in the operational management and some at the middle management are such that they are based on one or two aspect of a decision making situation. It does not call for any elaborate computations, analysis, choice etc. for decision making. If the status is known, the decision is automatic, i.e. status and solution is a unique relation.

(b) Data Analysis Systems : These decision systems and based on comparative analysis and makes use of a formula or an algorithm. But these processes are not structured and therefore vary. The cash flow analysis, inventory analysis and the personnel inventory systems are examples of the analysis systems. The use of simple data processing tools and business rules are required to developed this system.

(c) Information Analysis System : In this system, the data is analysied and the information reports are generated. The reports might be having some exceptions as a feature. The decision makers use these reports for assessment of the situation for decision making. The sales analysis, account receivables systems, market research analysis are examples of such systems.

(d) Accounting Systems : These systems are not necessary required for decision making but they are describe to keep track of the major aspects of the business or a function. The content of these systems is more of data processing which leads to formal reporting, with exceptions if necessary. These systems account it is such as cash, inventory personnel and so on and relate it to norms development by the management for control and decision making.

Q8. List the various component of DSS.

Ans. There are three main software components of a DSS. These are :

(a) Database Management Systems.
(b) Model Management Systems.
(c) Support Tools

(a) Database Management Systems : To solve a problem, the necessary data may come from internal and external database. In an organisation, internal data are generated by systems such as TPS and MIS; external data come from a variety of resources such as newspapers, online data services, database (financial, marketing, manufacturing, human resources etc.). Some examples of external data are government regulations, tax codes; census figures, competitors, market shares, economic indicators, interest rates and inflation. The data in the DSS database are managed by the DBMS, which covers compilation of data manipulation of data, data generation, data updating, data maintenance and dissemination of data.

(b) Model Management Systems : Model Management System, stores and access models that managers use to make decisions. Such models are used for designing a manufacturing facility, analysing the financial wealth of an organisation, forecasting

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demand for a product or service, and determining the quality of a particular branch of products. Although most models are quantitative, decision makers use qualitative models also to make decision.

The model builder, a component of many model bases, provides a structured framework for developing models by helping decision makers identify the variables and the interrelationship among the variables in the model. A model builder creates, identifies, processes, stores updates, and maintains different decision making models and ensures that these models are consistently applied when decisions are made. The model builder also contains a model dictionary for consistency in the definitions and uses of models. Some models that decision makers use to make decisions are statistical models production models, marketing models, human resources models, financial and accounting models and strategic models.

(c) Support Tools : Support Tool like online help, pull down menus, user interfaces, graphical analysis, error corrections mechanisms, facilitate the user interactions with the systems. Interface are an important support tools especially in the case of a DSS. Better the interface, the greater will be the chances of system being accepted by the user. Although managers recognise the power and potential of DSS, the main problem to its adoption is a lack of people with training in computer technologies. In such an environment, good interfaces can make or break the system.

Q9. Write down the functions of DSS.

Ans. There are five functions of DSS facilitating managerial decision making. They are as follows :

(a) Model Building : This allows decision makers to identify the most appropriate model for solving a problem on hand. It takes into account input variable, interrelationships among the variables, problem assumptions and constraints. For example, a Marketing Manager of a television manufacturing company is charged with the responsibility of developing a sales forecasting model for color TV sets. A model builder uses a structured framework to identify variables like demand, cost and profit, analyse the relationships among these variables, identify the assumptions if any and identify the constraints like the production capacity of the plant. All this information is then integrated by a system into a decision making models, which can be modified and updated whenever required.

(b) What if Analysis : This is the process of assessing the impact of changes to model variables, the values of the variables, or the interrelationships among variables. This helps managers to be proactive, rather than reactive, in their decision making. This analysis is critical for semi-structured and unstructured problems because the data necessary make such decisions are often either not available or incomplete. Hence, managers normally use their intuition and judgement in predicting the long terms implications of their decisions. Managers can prepare themselves to face a dynamic business environment by developing a group of scenarios (Best Case Scenario, worst case scenario and realistic scenario).

(c) Goal Seeking : It is the process of determining the input values required to achieve a certain goal. For example, house buyers determine the monthly payment they can afford (say for example, Rs. 5000) and calculate the number of such payments required to pay the desired house.

(d) Risk Analysis : It is a function of DSS that allows managers to assess the risks associated with various alternatives. Decisions can be classified as low risk, medium risk, and high risk. A DSS is particularly useful in medium risk and high risk environments.

(e) Graphical Analysis : This helps managers to quickly digest large volumes of data and visualize the impact of various courses of action. The use of groups are recommended when

- Seeking a quick summary of data.
- Detecting trends over time.
- Comparing points and patterns at different variables.
- Forecasting activities.
- Seeking relatively simple impressions from a vast amount of information.

Q10. Explain the different DSS Models.

Ans. The decision support systems can be based on the different types of models. They are given as:

Decision Support System (DSS)
- Behavioural Model
- Management Science Models
- Operation Research Models

(a) Behavioural Model : These models are useful in understanding the behaviour amongst the business variables. The decision maker can then more decision giving due regard to such behavioural relationships. Trend Analysis, forecasting and statistical analysis models belong to the category. Trend analysis indicate how different variables behave in trend setting in the past and hence in future. A regressions model shows the correlation between one or more variables. It also helps in identifying the influence of one variable on the other. These types of models are largely used in process control, manufacturing, agricultural sciences, medicines and marketing. The behavioural analysis can be used to set the points for alert, alarm and action for the decision maker.

(b) Management Science Models : These models are developed on the principles of business management, accounting and econometrics. In many areas of management, the proven methods of management control are available which can be used for management decisions. There are several management systems which can be converted into decision support system models. Budgetary systems, cost accounting systems, systems of capital budgeting for better return on investment. ABC analysis control of inventory through maximum-minimum levels are the examples of the use of the management science in Materials Management. Production Planning and control, scheduling and loading systems are the example of Production Management. Human resource planning and forecasting is the example of human resource management. Some of these models can be used straight away in the design of decision support systems.

(c) Operation Research Models : The operation research models are Mathematical Models. These models represent a real life problem situation in terms of the variables, constants and parameters expressed in algebraic equations. Since the models are mathematical, there are solutions to these problems. These models have clarity to the extent that each of them has a let of assumptions, which must be true in real life. Further, if the assumptions are valid, the solutions offered are realistic and practical, the model represents a real life problems.

Q11. Explain the brief the development of DSS.

Ans. The development of a DSS is determined by the type of information and the facilities required for taking decisions. Decision support systems are developed using programming languages or produced by packages specially incorporating decision support development tools.

In general, there are three methods for developing a DSS :

(1) DSS Generator : A DSS generator is comprised of programs such as data management tools, electronic spreadsheets, report generators, statistical packages, graphical packages, query languages, and model building tools that help in the development of DSS. Some commonly used DSS generators are – FOCUS, Excel and Lotus 1-2-3.

(2) DSS Shells : A DSS shell is a program used to build a customised DSS. Shells eliminate the need for developing the DBMS, Model Management System and user interfaces because skeletal resources of these models are readily available in the shell. A user can simply connect the shell with the appropriate external and internal database and input the appropriate models in order to have a fully functions DSS. System development can proceed at a rapid pace because of availability of basis versions of the DBMS, the Model Management System and the set of interfaces in the shell.

Shells have become user friendly, allowing even users with little or no programming background to develop fairly sophisticated systems. The main programming background to develop fairly sophisticated systems. The main disadvantage of a

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shell is that it may have to be customised to meet the need of the decision maker or the user may have to adopt the problem to the tool.

(3) Custom Made Software : Custom Made Software is designed and developed by organisations, who are committed to the DSS technology but cannot find a suitable generator on shell. The software is developed using a procedural language, such as C or a fourth generation language (4GL) such as FOCUS. Organisation may also choose to combine shells and customised software.

Q12. Which is the type of DSS that can be integrated in the MIS and which are types of worthy of integration? Discuss.

Ans. MIS and DSS Integration : The decision support system refers to a class of systems which support in the process of decision making and does not always give a decision itself. The nature of the decision is such that the decision makers need a variety of information, when same or similar types of decisions are to be made.

The DSS is a special class of system which is used as a support in decision making. Many of the decision making situations, at all levels of management, are such, that its occurrence is infrequent but the methodology of decision making is known. Some of the methods are proven and are widely used. Such applications are separated and are packed in the DSS.

These system use data from the general MIS and they are used by a manager or a decision maker for decision support. The basic characteristic of the DSS is that it is based on some tool, technique or model.

The DSS could be an internal part of the MIS. When the decision making need is in real time dynamic mode, all such systems are designed to read, measure, monitor, evaluate, analyse and act as per the decision guidance embedded in the system. For Example, in a simple case of order processing, the embedded DSS will accept or reject the order based on the CRISIL, credit rating, availability of stock and so on. If the order is accepted, the order acceptance is generated and the dispatch is scheduled for the ordered quantity. The MIS designer has to look for all such situations and design the DSS for integration in the system. The MIS would become more useful if the decision making is made person – independent and executed with well designed DSS. All such embedded systems cover the normal variety of decision situations. If anything outside the considered variety crops up, the DSS will bring to the notice of the decision makers that the action is called for in the situation. When the decision situation requires multidimensional analysis using the internal and external data, then such DSS are kept out of the main MIS design scope.

Decisions like a new product launch, price revision, appointing new dealers, change of product design are strategic decision which requires critical analysis of data, careful evaluation of various alternatives and selecting one of them for implementation on the given criteria. The DSS play a dominant role in the MIS as a support to decision making.

Q13. Write short note on Knowledge based expert system.

Ans. Knowledge Based Expert System :

An Expert System (ES) is a knowledge based information system that uses its knowledge about a specific, complex area to act as an expert consultant to end users. The components of an expert system include a knowledge base and software modules that perform inferences on the knowledge and communicate answers to a user's questions.

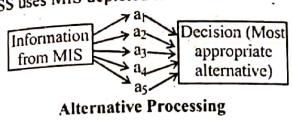
The knowledge base expert system contains (i) facts about a specific subject area and (ii) heuristic that express the reasoning procedures of an expert on the subject. There are many ways that such knowledge is represented in expert systems. For Example, rule based, frame based, object based and case based methods of knowledge representation. ***A summary of these knowledge base expert system is given below :***

1. **Frame-Based Knowledge :** Knowledge represented in the form of a hierarchy or network of frames. A frame is a collection of knowledge about an entity consisting of a complex package of data values describing its attributes.
2. **Object-Based Knowledge :** Knowledge represented as a network objects. An object is a data element that includes both data and the methods or processes that act on that data.
3. **Rule-Based Knowledge :** Knowledge represented in the form of rules and statements of fact.
4. **Case-Based Knowledge :** Representing knowledge in an ES knowledge base in the form of cases i.e., example of past performance, occurrences and experiences.

Q14. How DSS can be differentiated from MIS?

Ans. DSS goes one step further to a management information system as DSS supports decision-making.

DSS uses MIS depicted in-



Alternative Processing

DSS can be differentiated from MIS in terms of its processing capabilities. Whereas MIS process data, to convert to into information ; DSS processes information to support the decision making process of a manager. DSS helps the user decide in the best alternatives to choose from among a number of alternatives. DSS also provides an interactive dialogue environment, through which the user can interact with the system to add / alter the data as per his requirements. The main application areas of DSS are production, finance and marketing.

DSS provides new sets of capabilities for non-routine decision and user control. MIS provide managers with reports based on routine flows of data and assist in the general control of organizations, whereas, DSS emphasize change, flexibility and rapid response. MIS primarily address structured problems, DSS supports semi structured and unstructured problem analysis where problem solving is enhanced by an interactive dialog between the system and the user.

Q15. Write a note on Artificial Intelligence.

Ans. Artificial Intelligence (AI) :

Artificial intelligence is the intelligence of machines and the branch of computer science that aims to create it. While there are many different definitions, AI textbooks define the field as "the study and design of intelligent agents "where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1956, defines it as "the science and engineering of making intelligent machines."

The field was founded on the claim that a central property of humans, intelligence—the sapience of Homo sapiens—can be so precisely described that it can be simulated by a machine. This raises philosophical issues about the nature of the mind and the ethics of creating artificial beings, issues which have been addressed by myth, fiction and philosophy since antiquity Artificial intelligence has been the subject of optimism, but has also suffered setbacks and, today, has become an essential part of the technology industry, providing the heavy lifting for many of the most difficult problems in computer science.

AI research is highly technical and specialized, deeply divided into subfields that often fail in the task of communicating with each other. Subfields have grown up around particular institutions, the work of individual researchers, and the solution of specific problems, resulting in longstanding differences of opinion about how AI should be done and the application of widely differing tools. The central problems of AI include such traits as reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. General intelligence (or "strong AI") is still among the field's long term goals.

Uses :

1. Game playing : We can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people mainly through brute force computation—looking at hundreds of thousands of

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positions. To beat a world champion by brute force and known reliable heuristics requires being able to look at 200 million positions per second.

2. Speech recognition : In the 1990s, computer speech recognition reached a practical level for limited purposes. Thus United Airlines has replaced its keyboard tree for flight information by a system using speech recognition of flight numbers and city names. It is quite convenient. On the other hand, while it is possible to instruct some computers using speech, most users have gone back to the keyboard and the mouse as still more convenient.

3. Understanding natural language : Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.

4. Computer vision : The world is composed of three-dimensional objects, but the inputs to the human eye and computers' TV cameras are two dimensional. Some useful programs can work solely in two dimensions, but full computer vision requires partial three-dimensional information that is not just a set of two-dimensional views. At present there are only limited ways of representing three-dimensional information directly, and they are not as good as what humans evidently use.

5. Expert systems : A "knowledge engineer" interviews experts in a certain domain and tries to embody their knowledge in a computer program for carrying out some task. How well this works depends on whether the intellectual mechanisms required for the task are within the present state of AI. When this turned out not to be so, there were many disappointing results. One of the first expert systems was MYCIN in 1974, which diagnosed bacterial infections of the blood and suggested treatments. It did better than medical students or practicing doctors, provided its limitations were observed. Namely, its ontology included bacteria, symptoms, and treatments and did not include patients, doctors, hospitals, death, recovery, and events occurring in time. Its interactions depended on a single patient being considered. Since the experts consulted by the knowledge engineers knew about patients, doctors, death, recovery, etc., it is clear that the knowledge engineers forced what the experts told them into a predetermined framework. In the present state of AI, this has to be true. The usefulness of current expert systems depends on their users having common sense.

SECTION - C
Long Answer Questions
(15 Marks Each)

Q16. What is decision support system and how DSS can enhance decision-making.

Ans. Decision Support System (DSS) :

Decision Support System (DSS) are an application of Herbert Simon model. The model has three phases, viz. Intelligence, Design and Choice. The decision support system basically helps the information system in the intelligence phase where the objective is to identify the problem and then go to the design phase for solution. The choice of selection criterion varies from problem to problem. It is, therefore, required to go through these phases again and again till a satisfactory solution is found. In the use of three phase cycle, we may use either inquiry, analysis and models or accounting systems to come to a rational solution.

The decision support system helps in making a decision and also in its performance evaluation. These systems can be used to validate the decision by performing sensitivity analysis on various parameters of the problem.

Decision support system (DSS) are a natural progression from information reporting systems and transaction processing systems. DSS are interactive, computer-based information systems that use decision models and specialised databases to assist decision-making processes of managerial end users. Thus, they are different from transaction processing systems, which focus on processing the data generated by business transactions and operations, though they extract data from corporate databases maintained by TPS. They also differ from management information systems, which focus on providing managers with prespecified information (reports) that can be used to help them make more effective, structured type of decisions.

Instead, DSS provide managerial end users with information in an interactive session on an ad-hoc (as needed) basis. A DSS provides managers with analytical modeling, simulation, data retrieval and information presentation capabilities.

Thus information from a DSS differs from the prespecified responses generated by management information systems. When using a DSS, managers are simulating and exploring possible alternatives and receiving tentative information based on alternative sets of assumptions. Therefore, managerial end users do not have to specify their information needs in advance. Instead, a DSS interactively helps them find the information they need.

DSS can enhance decision making as it emphasizes the management orientation of information technology in business. A major goal of computer-based information system should be the support of management decision making, not merely the processing of data generated by business operations.

One strong reason for using DSSs is that existing information systems and MISs are not sufficient for meeting all the needs of information and decision making. Decision maker still has to look for additional information, analysis and a model for decision-making in certain one off scenarios. Exception reporting and controlling by using standards and targets are useful to some extend in decision-making. The single largest benefit of DSS is that it raises the capability of decision makers to make right rational decisions. The capability is built due to ***several abilities DSS provides to decision maker to deal with the problem:***

1. Ability to view data / information in different dimensions and sensing the problem, trend, pattern through different views.
2. Ability to understand and assess business performance and various result in terms of cause and effect and enabling to define the problem.
3. Ability to understand the problem and its ramifications, and ability to judge the impact on business.
4. Ability to assess the impact of any change in the business performance and enabling to focus on the areas where impact is negative.
5. Ability to view a complex scenario or problem and to design a model to analyse the problem develop alternatives to solve the problem, test the solution and to conduct sensitivity analysis.
6. Ability to make better decisions due to quick analysis, modeling, developing alternatives and testing for selection.
7. Ability to control the risk exposure in decisions.

DSS enables managers to construct databases for ad-hoc query, reporting, analysis, viewing and modeling the data to describe and understand the decision-making scenario. Manager through DSS, builds capability to execute the decision-making process 'Intelligent-design choice' built by Herbert Simon.

Q17. Define TPS. Give names of two types of TPS.

Ans. Transaction Processing System (TPS) :

A Transaction Processing System (TPS) is a type of information system that collects, stores, modifies and retrieves the data transactions of an enterprise.

A transaction is any event that passes the ACID test in which data is generated or modified before storage in an information system

A **transaction processing system** is a type of

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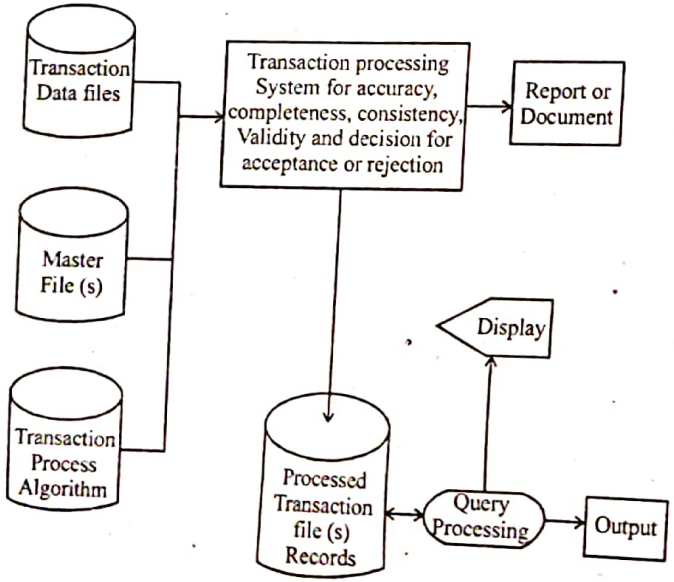
information system. TPSs collect, store, modify, and retrieve the transactions of an organization. A transaction is an event that generates or modifies data that is eventually stored in an information system. To be considered a transaction processing system the computer must pass the ACID test. The essence of a transaction program is that it manages data that must be left in a consistent state, for example, if an electronic payment is made, the amount must be both withdrawn from one account and added to the other; it cannot complete only one of those steps. Either both must occur, or neither. In case of a failure preventing transaction completion, the partially executed transaction must be 'rolled back' by the TPS. While this type of integrity must be provided also for batch transaction processing, it is particularly important for online processing: if for example, an airline seat reservation system is accessed by multiple operators, after an empty seat inquiry, the seat reservation data must be locked until the reservation is made, otherwise another user may get the impression a seat is still free while it is actually being booked at the time. Without proper transaction monitoring, double bookings may occur. Other transaction monitor functions include deadlock detection and resolution (deadlocks may be inevitable in certain cases of cross-dependence on data), and transaction logging (in 'journals') for 'forward recovery' in case of massive failures.

It is basically designed to handle a transaction between parties. The parties could be two or more and have a designated role in TPS. TPS uses data files, master files, transaction records and processes the data in a manner specified in the transaction process designed to execute the transaction. TPS output is a transaction in itself and updating the various other records based on the result processed as a part of the transaction execution.

In a payroll system, the payment of monthly salary to an employer is a transaction. It considers payment rules, employee payable days, and salary payment terms of the employee. This transaction uses employee master file, payable days, and salary computing algorithm to compute the payable salary. In this transaction the parties are organization and employee. The TPS has an objective of producing an amount, figure of payable salary for the month for all employees. **Figure given below shows a model of TPS.**



Features of Transaction Processing Systems :

The success of commercial enterprises depends on the reliable processing of transactions to ensure that customer orders are met on time, and that partners and suppliers are paid and can make payment. The field of transaction processing, therefore, has become a vital part of effective business management, led by such organizations as the **Association for Work Process Improvement** and the **Transaction Processing Performance Council.**

Transaction processing systems offer enterprises the means to rapidly process transactions to ensure the smooth flow of data and the progression of processes throughout the enterprise.

Types of Transaction Processing Systems :

While the transaction process must be standardized to maximize efficiency, every enterprise requires a tailored transaction process that aligns with its business strategies and processes. ***For this reason, there are two broad types of transaction:***

1. Batch Processing : Batch processing is a resource-saving transaction type that stores data for processing at pre-defined times. Batch processing is useful for enterprises that need to process large amounts of data using limited resources.

Examples of batch processing include credit card transactions, for which the transactions are processed monthly rather than in real time. Credit card transactions need only be processed once a month in order to produce a statement for the customer, so batch processing saves IT resources from having to process each transaction individually.

2. Real Time Processing : In many circumstances the primary factor is speed. For example, when a bank customer withdraws a sum of money from his or her account it is vital that the transaction be processed and the account balance updated as soon as possible, allowing both the bank and customer to keep track of funds.

Q18. What do you mean by Artificial Intelligence System?

Ans. Artificial Intelligence System :

Artificial Intelligence (AI) technologies are being used in a variety of ways to improve the decision support provided to managers and business professionals in many companies.

AI-enabled applications are at work in information distribution and retrieval, database mining, product design, manufacturing, inspection, training, user support, surgical planning, resource scheduling and complex resource management. Indeed, for anyone who schedules, plans, allocates resources, designs new products, uses the Internet, develops software is responsible for product quality is an investment professional, heads up IT, uses IT, or operates in any of a score of other capacities and arenas, AI technologies already may be in place and providing competitive advantage.

Artificial Intelligence (AI) is a field of science and technology based on disciplines such as computer science, biology, psychology, linguistics, mathematics and engineering. The goal of AI is to develop computers that can simulate the ability to think, as well as see, hear, walk, talk and feel. A major thrust of artificial intelligence is the simulation of computer functions, normally associated with human intelligence such as reasoning, learning and problem solving, as summarized in figure.

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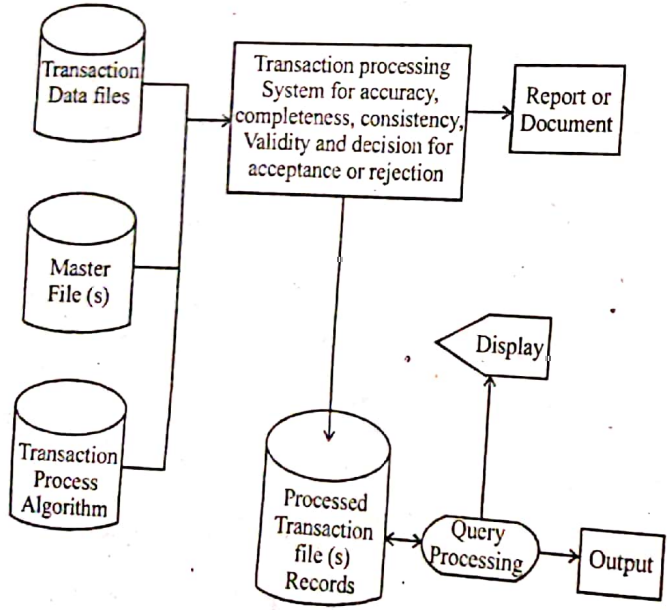

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AI-enabled applications are at work in information distribution and retrieval, database mining, product design, manufacturing, inspection, training, user support, surgical planning, resource scheduling and complex resource management. Indeed, for anyone who schedules, plans, allocates resources, designs new products, uses the Internet, develops software is responsible for product quality is an investment professional, heads up IT, uses IT, or operates in any of a score of other capacities and arenas, AI technologies already may be in place and providing competitive advantage.

Artificial Intelligence (AI) is a field of science and technology based on disciplines such as computer science, biology, psychology, linguistics, mathematics and engineering. The goal of AI is to develop computers that can simulate the ability to think, as well as see, hear, walk, talk and feel. A major thrust of artificial intelligence is the simulation of computer functions, normally associated with human intelligence such as reasoning, learning and problem solving, as summarized in figure.

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Attributes of Intelligent Behavior
1. Think and reason
2. Use reason to solve problems.
3. Learn or understand from experience.
4. Acquire and apply knowledge.
5. Exhibit creativity and imagination.
6. Deal with complex or perplexing situations.
7. Respond quickly and successfully to new situations.
8. Recognize the relative importance of elements in a situation.
9. Handle ambiguous, incomplete or erroneous information.

FIGURE: Some of the attributes of intelligent behavior. AI is attempting to duplicate these capabilities in computer-based systems.

Figure below illustrates the major **domains** of AI research and development. Note that AI **applications** can be grouped under three major areas—cognitive science, robotics and natural interfaces—though these classifications do overlap and other classifications can be used.

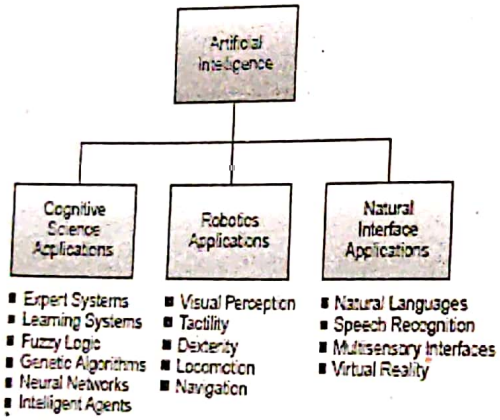

FIGURE: The major application areas of artificial intelligence.

Artificial intelligence includes :

1. **Games playing :** Programming computers to play games such as chess and checkers.
2. **Expert systems :** Programming computers to make decisions in real-life situations (for example, some expert systems help doctors diagnose diseases based on symptoms).
3. **Natural language :** Programming computers to understand natural human languages.
4. **Neural networks :** Systems that simulate intelligence by attempting to reproduce the types of physical connections that occur in animal brains.
5. **Robotics :** Programming computers to *see* and *hear* and react to other sensory stimuli.

Figure below outlines some of the latest developments in commercial applications of artificial intelligence :

Commercial Applications of AI
Decision Support : 1. Intelligent work environment that will help us capture the why as well as the what of engineered design and decision making. 2. Intelligent human – computer interface (HCI) systems that can understand spoken language and gestures and facilitate problem solving by supporting organization's wide collaborations to solve particular problems. 3. Situation assessment and resource allocation software for uses that range from airlines and airports to logistics centres.
Information Retrieval : 1. AI-based intranet and internet systems that distill tidal waves of information into simple presentations. 2. Natural language technology to retrieve any sort of online information, from text to pictures, videos, maps and audio clips, in response to English questions. 3. Database mining for marketing trend analysis, financial forecasting, maintenance cost reduction and more.
Virtual Reality : 1. X-ray-like vision enabled by enhanced-reality visualization that allows brain surgeons to "see through" intervening tissue to operate, monitor and evaluate disease progression. 2. Automated animation interfaces that allow users to interact with virtual objects via touch (e.g. medical students can "feel" what its like to suture severed aortas).
Robotics : 1. Machine-vision inspection systems for gauging, guiding, identifying and inspecting products and providing competitive advantage in manufacturing. 2. Cutting-edge robotics systems from microrobots and hands and legs to cognitive robotic and trainable modular vision systems.

Figure : Examples of some of the latest commercial applications of AI.

Q19. Discuss Enterprise Management System. What are its advantages?

Ans. Enterprise Management System (EMS) :

The dynamic business environment of today is full of challenges and opportunities. Every business activity has additional dimensions viz, speed and time. The business needs of today are beyond the transaction processing. It requires an instant real time response in every case, whenever it occurs.

The word enterprise is chosen to convey that it encompasses the larger business community covering all the players and their participation in the business. The system is extended beyond the corporate boundaries. In such a scenario, the system which we are designing is an enterprise wide system. It must catch an event, interpret it and trigger the action and communicate it across the enterprise. Since, business is information hungry, it must have an ability to sense the situation and act accordingly. When the business requires online information to make the informed, knowledge based decisions and have them executed in the business operations in a coordinated manner, it has to take support of many other systems.

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Role Played by Components of EMS :

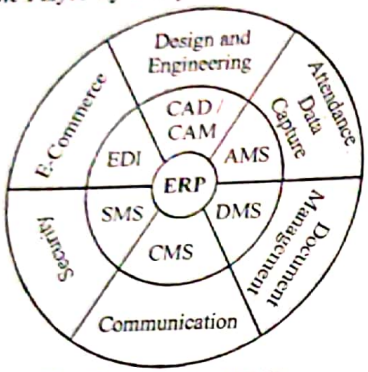

Fig : Components of EMS

In the EMS, ERP systems play the role of the front running systems. The major decision making and its execution takes place through the ERP. It is a system of managing all functions of the business with information support coming through the ERP.

The ERP is supported by various other support systems which manage independently the specific requirements and simultaneously provide inputs to the ERP. The EDI system assists the ERP in connecting two systems electronically for E-mail, Documents transfer, Data transfer etc. It is designed to handle the commercial functions of the business popularly known as the E-commerce.

The CAD/CAM/CAE systems are the systems which handle design, manufacturing and engineering functions. It provide the drawing and design engineering information to the ERP in its execution of manufacturing, purchase and inspection functions. They are also equipped with DBM facilities and their database act as a backup support to the ERP.

The AMS i.e. Attendance Management System keeps track of the employee related information for personnel planning, availability and scheduling. It provides static information about an employee through the HRM system and the current dynamic information such as his/her presence, shift rotation, the kind of job handled, the cost and so on.

The DMS i.e Document Management System is designed to keep important documents in the database for viewing, sending messages and for documenting support in the transactions handled. In ERP, it is used for cross checking the key information and also to confirm the authenticity of the transaction.

Advantages of EMS :

The CMS or the Communication Management System are used for tracking the important resource for action. These resources are located, altered and advised to act from the location, where they are. The ERP uses the CMS as a tool for all its communication needs of recording an event.

The SMS or the Security Management System handles the security, entry access requirement of the business operations. It may be a person, a vehicle or material. It provides a support to ERP by clearing the situation to act further.

These six systems (i.e. EDI, SMS, CMS, DMS, AMS & CAD/CAM) together act as the support system to the ERP. All these systems are extensively used for the main purpose for which they are installed. Each one of them has a specific technology to handle the function and is equipped to capture, store, process and transfer the data to the ERP. Each of these systems operate on their native systems and are interfaced to the ERP through the gateway by using a specific software.

Though the tools, technologies, well designed solutions and systems are available to support all such needs of the business, what is needed is an integrated solution out of these technologies and the systems offering an enterprise wide management support. Such an integrated solution is called as the Enterprise Management System (EMS).

Q20. What do you understand by Enterprise Resource Planning (ERP)? What are the benefits of using it? Also explain how it is different from Enterprise Management System (EMS)?

Ans. Enterprise Resource Planning (ERP) :

The ERP system deals with the planning and use of resources used in the business. The resources are finance, materials, manufacturing capacity and human resource. The ERP provides methodology of assessing the resource needs for a given business

plan to achieve certain business objectives. It also helps to execute the strategies, plans, decisions and actions in a time bound manner. The ERP provides a support system in the transaction processing, updation and reporting across the functions. The ERP is a package encompassing all major functions of the business. The product is generic in nature and is supposed to incorporate the best business practices, generally followed in most of the companies.

The ERP packages build information base and provide knowledge base for planning and control of the business through the business function management. The ERP is the main system, interfaced or assisted by the other systems in the organization. These systems may stand alone or form a part of the manufacturing or commercial processing systems.

Benefits of the ERP :

1. Better management of resources reducing the cost of operations.
2. Planning at function and process level increase in the productivity of the business.
3. Customer satisfaction increase due to shorter delivery cycle. Closer contact with customer.
4. Simultaneous activisation of the decision centers because of instant inducement through triggers or updates.
5. Business operations transparency between business partners cutting down the execution time of critical business operations.
6. Intelligent ERP download the decision making at lower level, releasing the burden on the middle management.
7. Due to faster processing technology and SQL, management can see the information in their perspective and take different view of the business.
8. Since, the ERP design is proactive, it makes the management alert at a number of points demanding the decision or action.
9. The processes become faster due to work group technology and application of work flow automation.
10. The ERP still remain a valid solution with the expansion of business as it is a scalable architecture.
11. The ERP scope can be enlarged through the Internet / Internet access, making the ERP sensitive to the latest events in the business and technology.
12. The quality of decision making improve as the user decision maker is made alert and knowledgeable and better informed dynamically.

There is a qualitative change in the MIS design due to the complexity of the business operations and the risk involved in handling the business.

The management focus is shifting from the function to the process, i.e., the management requires the information support in the process management and not in the function management.

The process definition now goes beyond the organizations boundary. It connects the organization to other agencies. The emphasis is on the automation of processes with a strong Information technology, implementation. Todays enterprise has ERP, SCM, CRM implementations up and running effectively, an integrated system of ERP, SCM a CRM is called an EMS.

The MIS is now required to maximise the process productivity and performance. The decision making support is required for the process optimization. The decision models are built across the business management functions. Besides the normal MIS reports required for the top management, the top management also need a set of the additional reports, where the critical business process and the critical success factors are a focus area.

The EMS solution caters to this requirement very easily. The ERP solution is an integrated solution. The Solution operation is seamless, disregarding the hardware or the software platform. The EMS solution takes care of data integrity and consistency across the extended organization.

In today's competitive world, the shift of decision making is towards strategic management of the business. The EMS solution, due to its scope and coverage, and supported by a variety of tools, enables strategic management based on the strategic information for decision making.

The management attention on the focused area

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is easily possible. The conventional MIS design is more or less embedded in the ERP solution. They provide all the routine reports at any time for the middle management of the organization.

Q21. What is the benefit of Enterprise Resource Planning? Explain.

Ans. ERP is the technological backbone of e-business, an enterprise-wide transaction framework with links into sales order processing, inventory management and control, production & distribution planning and finance.

ERP (Enterprise Resource Planning) is a system that integrates various organizational processes such as HR management, accounting inventory, purchasing and manufacturing. It is a cross-functional enterprise system driven by an integrated suite of software modules that supports the basic internal business processes of a company.

For Example : ERP software for a manufacturing company will typically process the data from and track the status of sales, inventory, shipping and invoicing as well as forecast raw material and human resource requirements. ***Figure below presents the major application components of an ERP system.***

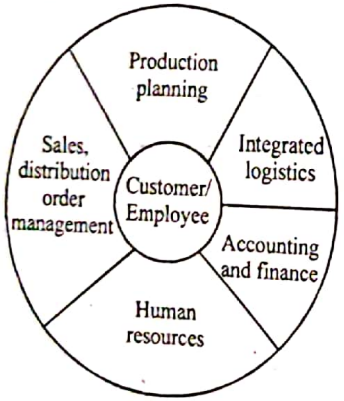

Figure : Major Application Components of ERP

ERP gives a company, an integrated real-time view of its core business processes such as production, order processing and inventory management tied together by the ERP application software and a common database maintained by a database management system. ERP systems track business resources (such as cash, raw materials and production capacity) and the status of commitments made by the business (such as customer orders, purchase orders and employee payroll) no matter which department has entered the data into the system.

Main Benefits of ERP :

ERP systems can generate significant business benefits for a company. They are as follows :

1. Quality and Efficiency : ERP creates a framework for integrating and improving a company's internal business processes that results in significant improvements in the quality and efficiency of customer service, production and distribution.

2. Decreased Costs : Many companies report significant reductions in transaction processing costs and hardware, software, and IT support staff as compared to the non-integrated legacy systems that were replaced by their new ERP systems.

3. Decision Support : ERP provides vital cross-functional information on business performance quickly to managers to significantly improve their ability to make better decisions in a timely manner across the entire business enterprise.

4. Enterprise Agility : Implementing ERP systems break down many former departmental and functional walls or "silos" of business processes, information systems and information resources. This results in more flexible organizational structures, managerial responsibilities and work roles, and therefore, a more agile and adaptive organization and workforce that can more easily capitalize on new business opportunities.

Q22. With the help of suitable examples bring out the difference among TPS, DSS, ERP and Expert systems.

Ans. Transaction Processing System :

A transaction processing system is a type of information system. TPSs collect, store, modify, and retrieve the transactions of an organization.

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To be considered a transaction processing system the computer must pass the ACID test. The essence of a transaction program is that it manages data that must be left in a consistent state. For example, if an electronic payment is made, the amount must be both withdrawn from one account and added to the other, it cannot complete only one of those steps.

Decision Support System :

- Decision-making activities that supports business or organizational decision making.
- DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance.

Typical information that a decision support application might gather and present are:

- Inventories of information assets (including legacy and relational data sources, cubes, data warehouses, and data marts),
- Comparative sales figures between one period and the next,
- Projected revenue figures based on product sales assumptions.

One example is the clinical decision support system for medical diagnosis. Other examples include a bank loan officer verifying the credit of a loan applicant or an engineering firm that has bids on several projects and wants to know if they can be competitive with their costs.

DSS is extensively used in business and management. Executive dashboard and other business performance software allow faster decision making, identification of negative trends, and better allocation of business resources.

Enterprise Resource Planning :

Enterprise resource planning (ERP) integrates internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, CRM, etc. ERP systems automate this activity with an integrated software application. Its purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders.

ERP systems can run on a variety of hardware and network configurations, typically employing a database to store data.

ERP systems typically include the following characteristics:

- An integrated system that operates in real time (or next to real time), without relying on periodic updates.
- A common database, which supports all applications.
- A consistent look and feel throughout each module.
- Installation of the system without elaborate application/data integration by the Information Technology (IT) department

Expert System :

In artificial intelligence, an **expert system** is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning about knowledge, like an expert, and not by following the procedure of a developer as is the case in conventional programming. The first expert systems were created in the 1970s and then proliferated in the 1980s. Expert systems were among the first truly successful forms of AI software.

An expert system has a unique structure, different from traditional programs. It is divided into two parts, one fixed, independent of the expert system: the inference engine, and one variable: the knowledge base. To run an expert system, the engine reasons about the knowledge base like a human. In the 80's a third part appeared: a dialog interface to communicate with users. This ability to conduct a conversation with users was later called "conversational".

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