BA4106-INFORMATION MANAGEMENT
UNIT-I

1. State the definition of Data

Data contains raw figures and facts. In computing, data is information that has been translated into a form that is efficient for movement or processing. Relative to today's computers and transmission media, data is information converted into binary digital form. It is acceptable for data to be used as a singular subject or a plural subject. Raw data is a term used to describe data in its most basic digital format.

2. State the definition of Information

Information unlike data provides insights analyzed through the data collected. Information can't exist without data but data doesn't rely on the information. knowledge that you get about someone or something: facts or details about a subject. They're working to collect/gather information about the early settlers in the region. The pamphlet provides a lot of information on/about/concerning recent changes to the tax laws. detailed/specific information.

3. List out the characteristics of Information.

- Completeness Information should be complete in sense. It should contain all facts & figures as required by the user. Unless it contains all details, it is not useful.Incomplete information may lead to wrong decisions. Information should be collected from all the sources & provided for decision making.
    - Cost-Effective It is one of the important features of information. It refers to the cost involved in the collection of information. The cost of collection should be within the decided set limit.
    - Accuracy Information collected should be reliable & correct. It should contain complete facts & figures. The sources of information collected should be reliable.

4. State the difference between Data and Information.

Data is unorganised and unrefined facts	Information comprises processed, organised data presented in a meaningful context
Data is an individual unit that contains raw materials which do not carry any specific meaning.	Information is a group of data that collectively carries a logical meaning.

5. State the definition of Intelligence with example.

By the Collins English Dictionary, intelligence is 'the ability to think, reason, and understand instead of doing things automatically or by instinct'. Intelligence can be defined as the ability to solve complex problems or make decisions with outcomes benefiting the actor, and has evolved in lifeforms to adapt to diverse environments for their survival and reproduction.

6. What do you meant by Information Technology?

The study or use of systems (especially computers and telecommunications) for storing, retrieving, and sending information. Information technology (IT) is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data.

7. What is System?

A system is a combination or arrangement of parts to form an integrated whole according to some common principles or rules. A system is a plan or method of doing something. A

system is an assembly of elements arranged in a local order to achieve certain objectives. The organization is also a system of people where people are selected on the basis of number, quality and ability and are placed in hierarchical order plan and execute the business activities to achieve certain goals and objectives.

8. Explain information.

Information is what is used in the act of informing or the state of being informed. Information includes knowledge acquired by some means. It is processed data which in turn is collection of raw facts, observations and figures.

9. What is meant by Management?

Management is the process of allocating an organization's inputs, including human and economic resources, by planning, organizing, directing, and controlling for the purpose of producing goods or services desired by customers so that organizational objectives are accomplished.

10. Define MIS.

Information system at the management level of an organization that serves the functions of planning, controlling, and decision making by providing routine summary and exception reports.

11. What do you mean by Data?

Data is a series of non-random symbols, numbers, values or words, a series of facts obtained by observation or research, a collection of non-random facts, the record of an event or fact. **Examples of Data:** Today's date, Measurements taken on a production line, Records of business transactions.

12. Distinguish between Data and Information

S.No	DAT	INFORMATIO
1	Data is the raw facts	Information is the processed data
2	Data is input	Information is output
3	Data is unorganized	information is organized
4	Data can't add anything to knowledge	Information enhances the
5	Data doesn't contain an element of	Information contain an element of

13. List out the different types of Information.

a. Action vs. Non Action:
b. Historical, Present, and Futuristic:
c. Documentary V,s. Non Documentary:
d. Formal Vs. Informal
e. Short Term Vs, Long Term
f. Internal Vs. External
g. Recurring Vs. Non Recurring

14. Explain any two types of Information

Formal Vs. Informal: Information generated through is known as formal information. For example, the financial reports, balance sheets, production plans etc. Similarly any information which not generated formally, like office gossip is informal information.

Action vs. Non Action: Any information on receiving it if one has to take certain action is known as action information. For example, if one receives information that something is wrong in the production line then immediate action has to be taken to rectify the matter.

15. List out the Characteristics of Information

a. Timeliness
b. Appropriateness
c. Accuracy
d. Conciseness
e. Frequency
f. Understandability
g. Relevant
h. Complete
i. Current
j. Economical

16. What is Intelligence?

Intelligence: Change from an information organizer to an intelligence analyst: What does the information mean? What are the implications? Are there any trends? If there are any gaping questions that are unanswered, ask if more data will help you make your decision. If yes, then get it; if not, then it is time to act.

17. Define IT.

Information technology refers to all forms of technology applied to processing, storing, and transmitting information in electronic form.

18. What is Information System?

An organized combination of People, Hardware, Software, Communication networks, and Data resources, that collects, transforms and disseminates information in an organization.

19. Explain the functions of information system.

1. It is a major functional area of a business as like accounting, finance, operations management, marketing, marketing, and HRM.
2. It is an important contributor to operational efficiency, employee productivity and morale, and customer service and satisfaction.
3. It is a major source of information and support needed to promote effective decision making by managers.
4. It is an important ingredient in developing competitive products and services that give an organization a strategic advantage in the global marketplace.
5. It is a major part of the resources of an enterprise and its cost of doing business, thus posing a major resource management challenge.
6. A vital, dynamic, and challenging career opportunity for millions of men and women

20. List out the different Activities of Information System

a. Input of data resource
b. Processing of data into information
c. Output of information products
d. Storage of data resource
e. Control of system performance

21. What are all the components of Information System?

i. People,
ii. Hardware,
iii. Software,
iv. Data, and
v. Networks

22. Clearly list out the Software and Hardware Components of Information System

Hardware Resources: Computer systems, Computer peripherals,
Software Resources: System Software, Application, Software, Procedures

23. Explain the Evolution process of MIS from EDP.

Until the 1960s, the role of most information systems was simple. They were mainly used for electronic data processing (EDP), purposes such as transactions processing, record-keeping and accounting. EDP is often defined as the use of computers in recording, classifying, manipulating, and summarizing data. It is also called transaction processing systems (TPS), automatic data processing, or information processing.

Transaction processing systems – these process data resulting from business transactions, update operational databases, and produce business documents. Examples: sales and inventory processing and accounting systems.

24. Name out the Six Different Information Systems used in different level of management

a. Executive Support Systems (ESS)
b. Management Information Systems (MIS)
c. Decision Support Systems (DSS)
d. Knowledge Work Systems (KWS)
e. Office Automation Systems (OAS)
f. Transaction Processing Systems (TPS)

25. Define KWS

Information system that aids knowledge workers in the creation and integration of new knowledge in the organization. Information system at the strategic level of an organization that addresses unstructured decision making through advanced graphics and communications.

PART-B

1. Explain the importance and nature of MIS with suitable diagram.

Management Information System is formal method of collecting information in summarized form. It is network established within an organization to provide information to managers. It provides systematic and analytical information necessary to all level of

managers. It helps managers to take right decision at the right time. Importance of MIS is described as follows:

1. Management Information System is always management oriented and keeps in view every level of management and gets the desired information.

2. Integrated – refers to how different components (sub systems) are actually tied up together. eg: different departments of organization linked together.

3. Useful for planning – as every organization makes log-term and short-term plans with the help of information like sales & production, capital investments, stocks etc management can easily plan..

4. Effective Management Information System helps the management to know deviations of actual performance from pre-set targets and control things.

5. It‘s important for increasing efficiency.

6. MIS provides updated results of various departments to management.

7. MIS is highly computerized so it provides accurate results.

8. MIS adds to the intelligence, alertness, awareness of managers by providing them information in the form of progress and review reports of an ongoing activity.

9. Helps managers in decision- making.

To gain the maximum benefits from your company's information system, you have to exploit all its capacities. Information systems gain their importance by processing the data from company inputs to generate information that is useful for managing your operations. To increase the information system's effectiveness, you can either add more data to make the information more accurate or use the information in new ways.

Management Information Systems (MIS) not only include software systems, but the entire set of business processes and resources that are used to pull together information from functional or tactical systems. Data is then presented in a user-friendly and timely manner so that mid and upper-level managers can use it to take the right actions. The entire system is designed so that the company will meet its strategic and tactical goals.

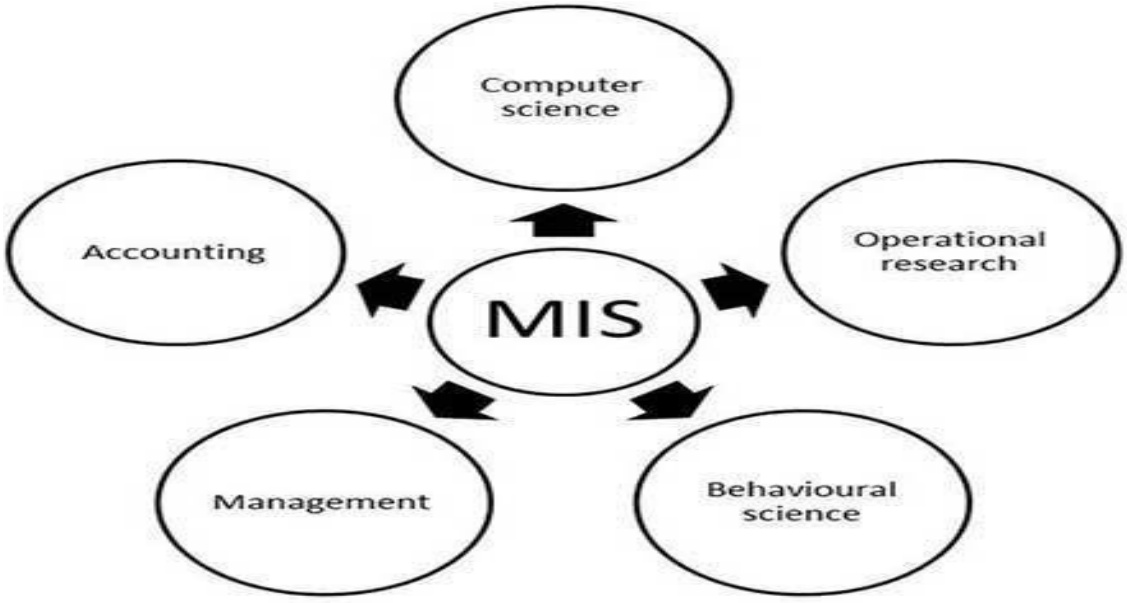
Nature and Scope of MIS:

The concept of MIS is interdisciplinary in nature, i.e. it has borrowed its concepts from a large number of disciplines like Accounting, Computers, Organizations, Management, Operations Research and Behavioural Sciences, etc .MIS is neither a pure science nor an art; it is recognized as a combination of both. An information system is a logical system, which is concerned with _how‘ something is being accomplished and thus may be differentiated from physical system, which is the process itself and is concerned with the content or _what‘ is going on.MIS ,in fact encompasses both physical and information systems. There has been a lot of debate on the issue whether MIS is more management –

oriented or computer –oriented. Though there are advocates of both sides, MIS should be considered more of a management subject than of computers because of the simple logic that computers are just tool in the hands of managers. Computers are used for their characteristics like accuracy, speed and capacity to handle large amount of data.

Nowadays MIS finds application in all functional areas of every type of business organizations at all levels. MIS caters to information needs of managers in an organization, thus its scope lies in structured as well as unstructured type of information which could be gathered from internal as well as external sources of the organization.

Further, with the advent of computers and communication technology, the scope of MIS has increased manifold.



2.Explain the Structure of MIS

Structure of MIS may be understood by looking at the physical components of the information system in an organization. The physical components of an organizational information system may be hardware, software, database, manual procedures and operating persons. A brief description of these components has been outlined in the following paragraphs:

Hardware:

Hardware refers to the physical data processing equipment and peripheral devices, For example, CPU, monitor, keyboard, printer, drives, tapes, communication devices, etc.

Software:

Software is a broad term given to the instructions or programs that direct the operating of the hardware. Software could be of two types, i.e. system software and application software.

Database:

The database consists of all data utilized by application software. Data is stored in files.

Procedures:

Formal operating procedures, which are required to operate a system, such as manuals, are also regarded as physical elements.

Operating Personnel:

Personnel like Computer Operators, Computer Programmers, System Analysts, System Managers, etc., are the operating people of the information systems.

Input and Output:

Various physical inputs and outputs from the information system, existing in forms like printout, reports etc**.**

3.Explain the classification of Information System

MIS - Classification of Information:

Information can be classified in a number of ways:

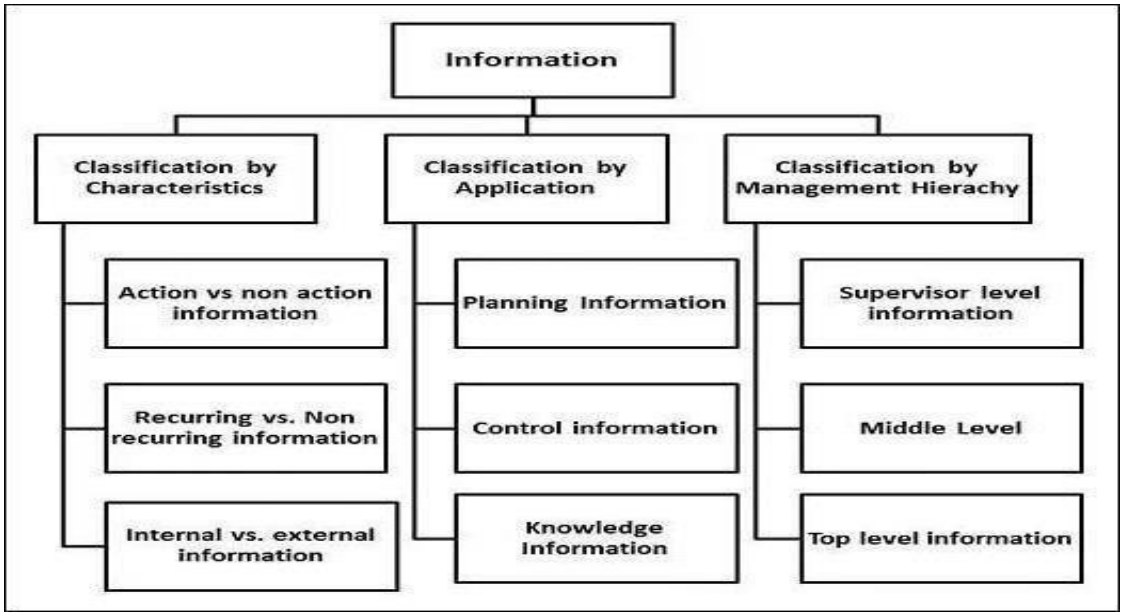
1. **Classification by Characteristic** :-Based on Anthony's classification of Management, information used in business for decisionmaking is generally categorized into three types:

- **Strategic Information**: Strategic information is concerned with long term policy decisions that defines the objectives of a business and checks how well these objectives are met. For example, acquiring a new plant, a new product, diversification of business etc, comes under strategic information.
- **Tactical Information**: Tactical information is concerned with the information needed for exercising control over business resources, like budgeting, quality control, service level, inventory level, productivity level etc.
- **Operational Information**: Operational information is concerned with plant/business level information and is used to ensure proper conduction of specific operational tasks as planned/intended. Various operator specific, machine specific and shift specific jobs for quality control checks comes under this category.

Classification by Application

In terms of applications, information can be categorized as:

- **Planning Information**: These are the information needed for establishing standard norms and specifications in an organization. This information is used in strategic, tactical, and operation planning of any activity. Examples of such information are time standards, design standards.
- **Control Information**: This information is needed for establishing control over all business activities through feedback mechanism. This information is used for controlling attainment, nature and utilization of important processes in a system. When such information reflects a deviation from the established standards, the system should induce a decision or an action leading to control.
- **Knowledge Information**: Knowledge is defined as "information about information". Knowledge information is acquired through experience and learning, and collected from archival data and research studies.
- **Organizational Information**: Organizational information deals with an organization's environment, culture in the light of its objectives. Karl Weick's Organizational Information Theory emphasizes that an organization reduces its equivocality or uncertainty by collecting, managing and using these information prudently. This information is used by everybody in the organization; examples of such information are employee and payroll information.
- **Functional/Operational Information**: This is operation specific information. For example, daily schedules in a manufacturing plant that refers to the detailed assignment of jobs to machines or machines to operators. In a service oriented business, it would be the duty roster of various personnel. This information is mostly internal to the organization.
- **Database Information**: Database information construes large quantities of information that has multiple usage and application. Such information is stored,



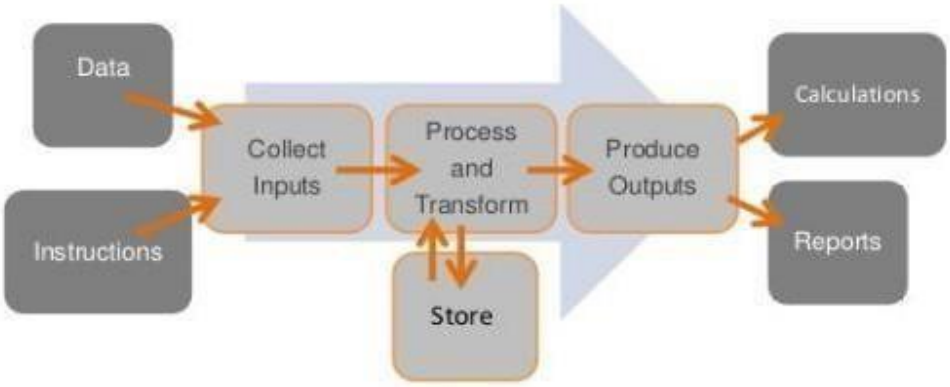
retrieved and managed to create databases. For example, material specification or supplier information is stored for multiple users.

Information and Systems Concept:

An information system (IS) is an organized system for the collection, organization, storage and communication of information. More specifically, it is the study of complementary networks that people and organizations use to collect, filters, and process, create and distribute data.

The concept that information is the message has different meanings in different contexts. Thus the concept of information becomes closely related to notions of constraint, communication, control, data, form, education, knowledge, meaning, understanding, mental stimuli, pattern, perception,

representation, and entropy.



Types of Information Systems:

1. TPS Transaction Processing System
2. MIS Management Information System
3. DSS Decision Support system
4. ESS Executive Support System
5. OAS Office Automation System

1. **TPS** are used primarily for structured operational, and to a lesser degree, management controlapplications.
2. **MIS** are used for semi--structured, management control applications. It also overlaps into the operational and strategic planning realms as well.
3. **DSS** are used primarily for unstructured decision-making whether that occurs at theoperational, management and strategic planning levels.
4. **ESS** is used primarily for structured management and strategic planning applications.
5. **OAS** are used as a facilitator of office correspondence and communication,

underlies all ofthis activity.

A typical organization is divided into operational, middle, and upper level. The information requirements for users at each level differ. Towards that end, there are number of informationsystems that support each level in an organization.

- ✓ Pyramid Diagram of Organizational levels and information requirements
- ✓ Transaction Processing System (TPS)
- ✓ Management Information System (MIS)
- ✓ Decision Support System (DSS)
- ✓ Artificial intelligence techniques in business
- ✓ Online Analytical Processing (OLAP)

4. Pyramid Diagram of Organizational levels and information requirements

Understanding the various levels of an organization is essential to understand the information required by the users who operate at their respective levels.

The following diagram illustrates the various levels of a typical organization.

Operational Management Level

The operational level is concerned with performing day to day business transactions of the organization.

Examples of users at this level of management include cashiers at a point of sale, bank tellers, nurses in a hospital, customer care staff, etc.

Users at this level use make structured decisions. This means that they have defined rules that guides them while making decisions.

For example, if a store sells items on credit and they have a credit policy that has some set limit on the borrowing. All the sales person needs to decide whether to give credit to a customer or not is based on the current credit information from the system.

Tactical Management Level

This organization level is dominated by middle-level managers, heads of departments, supervisors, etc. The users at this level usually oversee the activities of the users at the operational management level.

Tactical users make semi-structured decisions. The decisions are partly based on set guidelines and judgmental calls. As an example, a tactical manager can check the credit limit and payments history of a customer and decide to make an exception to raise the credit limit for a particular customer. The decision is partly structured in the sense that the tactical manager has to use existing information to identify a payments history that benefits the organization and an allowed increase percentage.

Strategic Management Level

This is the most senior level in an organization. The users at this level make unstructured decisions. Senior level managers are concerned with the long-term planning of the organization. They use information from tactical managers and external data to guide them when making unstructured decisions.

Transaction Processing System (TPS)

Transaction processing systems are used to record day to day business transactions of the organization. They are used by users at the operational management level. The main objective of a transaction processing system is to answer routine questions such as;

- ✓ How printers were sold today?
- ✓ How much inventory do we have at hand?
- ✓ What is the outstanding due for John Doe?

By recording the day to day business transactions, TPS system provides answers to the abovequestions in a timely manner.

- The decisions made by operational managers are routine and highly structured.
- The information produced from the transaction processing system is very detailed.

For example, banks that give out loans require that the company that a person works for should have a memorandum of understanding (MoU) with the bank. If a person whose

employer has a MoU with the bank applies for a loan, all that the operational staff has to do is verify the submitted documents. If they meet the requirements, then the loan application documents are processed. If they do not meet the requirements, then the client is advised to see tacticalmanagement staff to see the possibility of signing a MoU.

Examples of transaction processing systems include

- Point of Sale Systems – records daily sales
- Payroll systems – processing employees salary, loans management, etc.
- Stock Control systems – keeping track of inventory levels
- Airline booking systems – flights booking management.

Management Information System (MIS)

Management Information Systems (MIS) are used by tactical managers to monitor the organization's current performance status. The output from a transaction processing system is used as input to a management information system.

The MIS system analyzes the input with routine algorithms i.e. aggregate, compare and summarizes the results to produced reports that tactical managers use to monitor, control and predict future performance.

For example, input from a point of sale system can be used to analyze trends of products that are performing well and those that are not performing well. This information can be used to make future inventory orders i.e. increasing orders for well-performing products and reduce the orders of products that are not performing well.

Examples of management information systems include

- **Sales management systems** – they get input from the point of sale system
- **Budgeting systems** – gives an overview of how much money is spent within the organization for the short and long terms.
- **Human resource management system** – overall welfare of the employees, staff turnover, etc.

Tactical managers are responsible for the semi-structured decision. MIS systems provide the information needed to make the structured decision and based on the experience of the tactical managers, they make judgement calls i.e. predict how much of goods or inventory should be ordered for the second quarter based on the sales of the first quarter.

5.Briefly explain about Decision Support System (DSS)

Decision support systems are used by senior management to make non-routine decisions. Decision support systems use input from internal systems (transaction processing systems and management information systems) and external systems.

The main objective of decision support systems is to provide solutions to problems that are

unique and change frequently. Decision support systems answer questions such as;

- ✓ What would be the impact of employees' performance if we double the production lot at the factory?
- ✓ What would happen to our sales if a new competitor entered the market?

Decision support systems use sophisticated mathematical models, and statistical techniques (probability, predictive modeling, etc.) to provide solutions, and they are very interactive.

Examples of decision support systems include

- **Financial planning systems –** it enables managers to evaluate alternative ways of achieving goals. The objective is to find the optimal way of achieving the goal. For example, the net profit for a business is calculated using the formula Total Sales less (Cost of Goods + Expenses). A financial planning system will enable senior executives to ask what if questions and adjust the values for total sales, the cost of goods, etc. to see the effect of the decision and on the net profit and find the most optimal way.
- **Bank loan management systems –** it is used to verify the credit of the loan applicant and predict the likelihood of the loan being recovered.

Artificial intelligence techniques in business

Artificial intelligence systems mimic human expertise to identify patterns in large data sets. Companies such as Amazon, Facebook, and Google, etc. use artificial intelligence techniques to identify data that is most relevant to you.

Let's use Facebook as an example, Facebook usually makes very accurate predictions of people that you might know or went with to school. They use the data that you provide to them, the data that your friends provide and based on this information make predictions of people that you might know.

Amazon uses artificial intelligence techniques too to suggest products that you should buy also based on what you are currently getting.

Google also uses artificial intelligence to give you the most relevant search results based on yourinteractions with Google and your location.

These techniques have greatly contributed in making these companies very successful because they are able to provide value to their customers.

Online Analytical Processing (OLAP)

Online analytical processing (OLAP) is used to query and analyze multi-dimensional data and produce information that can be viewed in different ways using multiple dimensions.

Let's say a company sells laptops, desktops, and Mobile device. They have four (4) branches A, B, C and D. OLAP can be used to view the total sales of each product in

all regions and compare the actual sales with the projected sales. Each piece of information such as product, number of sales, sales value represents a different dimension The main objective of OLAP systems is to provide answers to ad hoc queries within the shortest possible time regardless of the size of the datasets being used.

UNIT-II

2 MARK QUESTIONS

1. What is system development life cycle?

   The Systems Development Life Cycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information. system development project from an initial feasibility study through maintenance of the completed application.

2. What is feasibility study?

   Expanding on the Initial Idea, the Feasibility Study involves drawing up the terms of reference, which state the objectives and scope of the project, how long it should take and how the results should be presented.

3. What are the different stages of system development life cycle?

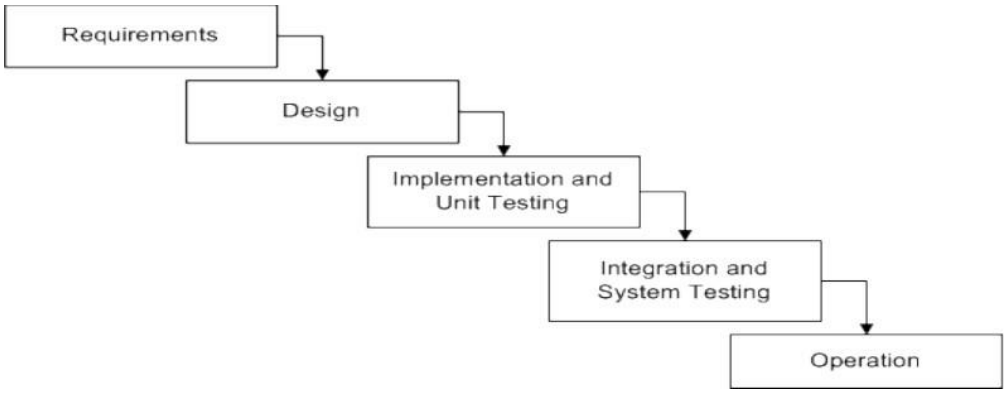
   - Feasibility study
   - Analysis
   - Design
   - Implementation
   - Testing
   - Development
   - Maintenance

4. What is system software lifecycle model?

   Software life cycle models describe phases of the software cycle and the order in which those phases are executed.

5. Explain waterfall model.

   This is the most common and classic of life cycle models, also referred to as a linear- sequential life cycle model. In a waterfall model, each phase must be completed in its entirety before the next phase can begin.



6. Depict waterfall diagram.

7. Explain v shaped model?

The V-Shaped life cycle is a sequential path of execution of processes. Each phase must be completed before the next phase begins.

8. Write any two merits and demerits of waterfall model

Merits

- Simple and easy to use.
- Easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process.

Demerits

- Adjusting scope during the life cycle can kill a project
- No working software is produced until late during the life cycle.

9. Explain incremental model.

The incremental model is an intuitive approach to the waterfall model. Multiple development cycles take place here, making the life cycle a "multi-waterfall" cycle. Cycles are divided up into smaller, more easily managed iterations.

10. What are the merits and demerits of incremental model?

Merits

- Generates working software quickly and early during the software life cycle.
- More flexible – less costly to change scope and requirements.
- Easier to test and debug during a smaller iteration.

Demerits

- Each phase of an iteration is rigid and do not overlap each other.
- Problems may arise pertaining to system architecture because not all requirements are gathered up front for the entire software life cycle.

11. Explain spiral model.

The spiral model is similar to the incremental model, with more emphases placed on risk analysis. The spiral model has four phases: Planning, Risk Analysis, Engineering and Evaluation.

12. What are the four phases of spiral model?

- ✓ Planning,
- ✓ Risk Analysis,
- ✓ Engineering and
- ✓ Evaluation.

13. What are the three activities of system design?

- ✓ user interface,
- ✓ data, and
- ✓ process design.

14. What is data and data flow diagram?

- **Data flow** is data flowing between processes, data stores and external entities. It is data in motion, moving from one place in a system to another.
- **Data flow diagram** is a method to illustrate how data flows in a system. DFD are versatile diagramming tools. Only 4 symbols are used to represent both physical and logical information system

15. What is context diagram?

Context Diagram is the highest level DFD.It defines the boundaries of a system by showing a single major process and the data inputs and output & entities involved. A common way to begin is to model the whole system by one process. The DFD that is involved in this is known as the Context Diagram.

16. What are the components of ERD?

- Object types
- Relationships
- Associative object type indicators
- Super type / Sub type indicators
-

17. Explain object modeling technique.

The Object Modeling Technique (OMT) is an object-oriented analysis, design, and implementation methodology that focuses creating a model of objects from the real world and then using this model to develop object-oriented software. OMT was developed by James Rumbaugh, et.

The purposes of modeling according to Rumbaugh are:

- testing physical entities before building them (simulation),
- communication with customers,
- visualization (alternative presentation of information), and
- reduction of complexity.

18. What is DBMS?

A database management system is a set of software programs that allows users to create, edit and update data in database files, and store and retrieve data from those database files. Data in a database can be added, deleted, changed, sorted or searched all using a DBMS.

19. What are inputs to the financial information system?

- Strategic plan or corporate policies
  - Contains major financial objectives and often projects financial needs.
- Transaction processing system (TPS)
  - Important financial information collected from almost every TPS – payroll, inventory control, order processing, accounts payable, accounts receivable, general ledger.
  - External sources
  - Annual reports and financial statements of competitors and general news items.

20. What is MIS?

A marketing information system (MIS) is a set of procedures and methods designed to generate, analyze, disseminate, and store anticipated marketing decision information on a regular, continuous basis. An information system can be used operationally, managerially, and strategically for several aspects of marketing.

21. What is System?

A system is a combination or arrangement of parts to form an integrated whole according to some common principles or rules. A system is a plan or method of doing something. A system is an assembly of elements arranged in a local order to achieve certain objectives. The organization is also a system of people where people are selected on the basis of number, quality and ability and are placed in hierarchical order plan and execute the business activities to achieve certain goals and objectives.

22. Explain information.

Information is what is used in the act of informing or the state of being informed. Information includes knowledge acquired by some means. It is processed data which in turn is collection of raw facts, observations and figures.

23. What is meant by Management?

Management is the process of allocating an organization's inputs, including human and economic resources, by planning, organizing, directing, and controlling for the purpose of producing goods or services desired by customers so that organizational objectives are accomplished.

24. Define MIS.

Information system at the management level of an organization that serves the functions of planning, controlling, and decision making by providing routine summary and exception reports.

25. What do you mean by Data?

Data is a series of non-random symbols, numbers, values or words, a series of facts obtained by observation or research, a collection of non-random facts, the record of an event or fact. **Examples of Data:** Today's date, Measurements taken on a production line, Records of business transactions.

PART-B

1. Explain the concept and evolution of E-Commerce

E-Commerce or Electronics Commerce is a methodology of modern business, which addresses the requirements of business organizations. It can be broadly defined as the process of buying or selling of goods or services using an electronic medium such as the Internet.

E-Commerce or Electronics Commerce is a methodology of modern business, which addresses the need of business organizations, vendors and customers to reduce cost and improve the quality of goods and services while increasing the speed of delivery.
Ecommerce refers to the paperless exchange of business information using the following ways −

- ✓ Electronic Data Exchange (EDI)
- ✓ Electronic Mail (e-mail)
- ✓ Electronic Bulletin Boards
- ✓ Electronic Fund Transfer (EFT)
- ✓ Other Network-based technologies

Features of E-Commerce:

1. **Non-Cash Payment** − E-Commerce enables the use of credit cards, debit cards, smart cards, electronic fund transfer via bank's website, and other modes of electronics payment.
2. **24x7 Service availability** − E-commerce automates the business of enterprises and the way they provide services to their customers. It is available anytime, anywhere.
3. **Advertising / Marketing** − E-commerce increases the reach of advertising of products and services of businesses. It helps in better marketing management of products/services.
4. **Improved Sales** − Using e-commerce, orders for the products can be generated anytime, anywhere without any human intervention. It gives a big boost to existing sales volumes.
5. **Support** − E-commerce provides various ways to provide pre-sales and post-

sales assistance to provide better services to customers.

6. **Inventory Management** − E-commerce automates inventory management. Reports get generated instantly when required. Product inventory management becomes very efficientand easy to maintain.
7. **Communication improvement** − E-commerce provides ways for faster, efficient, reliable communication with customers and partners.

E-commerce business models can generally be categorized into the following categories.

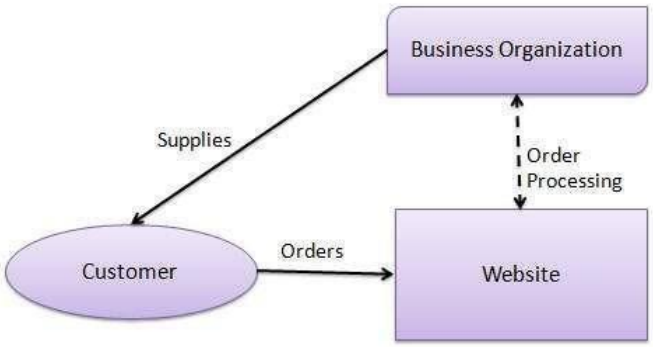
- Business - to - Business (B2B)
- Business - to - Consumer (B2C)
- Consumer - to - Consumer (C2C)
- Consumer - to - Business (C2B)
- Business - to - Government (B2G)
- Government - to - Business (G2B)
- Government - to - Citizen (G2C)

Business - to - Business

A website following the B2B business model sells its products to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to the final customer who comes to buy the product at one of its retail outlets.

Business - to - Consumer

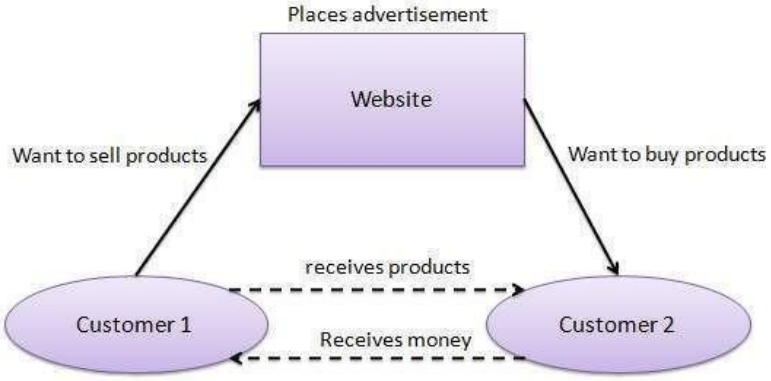
A website following the B2C business model sells its products directly to a customer. A customer can view the products shown on the website. The customer can choose a product and order the same. The website will then send a notification to the business organization via email and the organization will dispatch the product/goods to the customer.



Consumer - to - Consumer

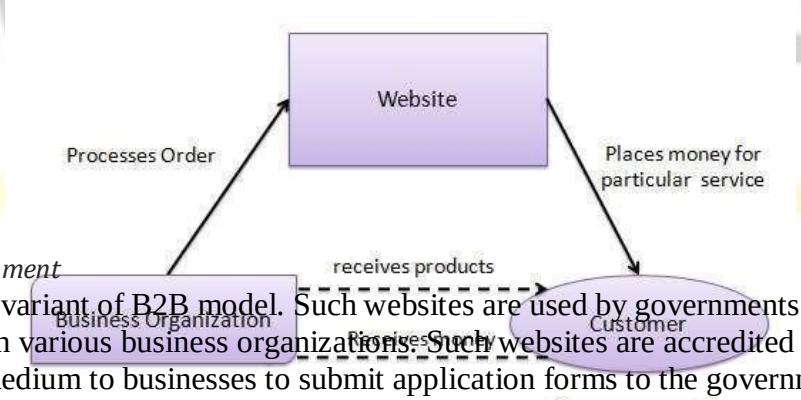
A website following the C2C business model helps consumers to sell their assets like residential property, cars, motorcycles, etc., or rent a room by publishing their information on the website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by

viewing the post/advertisement on the website.



Consumer - to - Business

In this model, a consumer approaches a website showing multiple business organizations for a particular service. The consumer places an estimate of amount he/she wants to spend for a particular service. For example, the comparison of interest rates of personal loan/car loan provided by various banks via websites. A business organization who fulfils the consumer's requirement within the specified budget, approaches the customer and provides its services.

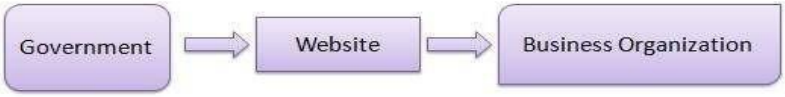


Business - to - Government

B2G model is a variant of B2B model. Such websites are used by governments to trade and exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government.

Government - to – Business

Governments use B2G model websites to approach business organizations. Such websites support auctions, tenders, and application submission functionalities.



Government - to - Citizen

Governments use G2C model websites to approach citizen in general. Such websites support auctions of vehicles, machinery, or any other material. Such website also provides services like registration for birth, marriage or death certificates. The main objective of G2C websites is to reduce the average time for fulfilling citizen‘s requests for various government services.

2.Briefly explain the advantages and disadvantages of E-Commerce.

E-Commerce advantages can be broadly classified in three major categories −

1. **Advantages to Organizations**
2. **Advantages to Consumers**
3. **Advantages to Society**

1. Advantages to Organizations

Using e-commerce, organizations can expand their market to national and international markets with minimum capital investment. An organization can easily locate more customers, best suppliers, and suitable business partners across the globe.

- ✓ E-commerce helps organizations to reduce the cost to create process, distribute, retrieve and manage the paper based information by digitizing the information.
- ✓ E-commerce improves the brand image of the company.
- ✓ E-commerce helps organization to provide better customer services.
- ✓ E-commerce helps to simplify the business processes and makes them faster and efficient.
- ✓ E-commerce reduces the paper work.
- ✓ E-commerce increases the productivity of organizations. It supports "pull" type supply management. In "pull" type supply management, a business process starts when a request comes from a customer and it uses just-in-time manufacturing way.

2.*Advantages to Customers*

- ✓ It provides 24x7 supports. Customers can enquire about a product or service and place orders anytime, anywhere from any location.
- ✓ E-commerce application provides users with more options and quicker delivery of products.
- ✓ E-commerce application provides users with more options to compare and select the cheaper and better options.

- ✓ A customer can put review comments about a product and can see what others are buying, or see the review comments of other customers before making a final purchase.
- ✓ E-commerce provides options of virtual auctions.
- ✓ It provides readily available information. A customer can see the relevant detailed information within seconds, rather than waiting for days or weeks.
- ✓ E-Commerce increases the competition among organizationsand as a result, organizations provide substantial discounts to customers.

3. *Advantages to Society*

Customers need not travel to shop a product, thus less traffic on road and low air pollution.

- ✓ E-commerce helps in reducing the cost of products, so less affluent people can also afford the products.
- ✓ E-commerce has enabled rural areas to access services and products, which are otherwise not available to them.
- ✓ E-commerce helps the government to deliver public services such as healthcare, education, social services at a reduced cost and in an improved manner.

The disadvantages of e-commerce can be broadly classified into two major categories

–

1. **Technical disadvantages**
2. **Non-Technical disadvantages**

Technical Disadvantages

There can be lack of system security, reliability or standards owing to poor implementation of e-commerce.

- ✓ The software development industry is still evolving and keeps changing rapidly.
- ✓ In many countries, network bandwidth might cause an issue.
- ✓ Special types of web servers or other software might be required by the vendor, setting the e-commerce environment apart from network servers.
- ✓ Sometimes, it becomes difficult to integrate an e-commerce software or website with existing applications or databases.
- ✓ There could be software/hardware compatibility issues, as some e-commerce software may be incompatible with some operating system or any other component.

Non-Technical Disadvantages

- ✓ Initial cost − The cost of creating/building an e-commerce application in-house may be very high. There could be delays in launching an e-Commerce application due to mistakes, and lack of experience.
- ✓ User resistance − Users may not trust the site being an unknown faceless seller. Such mistrust makes it difficult to convince traditional users to switch from physical stores to online/virtual stores.
- ✓ Security/ Privacy − It is difficult to ensure the security or privacy on online transactions.
- ✓ Lack of touch or feel of products during online shopping is a drawback.
- ✓ E-commerce applications are still evolving and changing rapidly.

- ✓ Internet access is still not cheaper and is inconvenient to use for many potential customers, for example, those living in remote villages.

3.Explain Evolution of ERP SYSTEM with a suitable diagram

Enterprise Resource Planning (ERP) is a software that is built to organizations belonging to different industrial sectors, regardless of their size and strength.

The ERP package is designed to support and integrate almost every functional area of a business process such as procurement of goods and services, sale and distribution, finance, accountings, human resource, manufacturing, production planning, logistics & warehouse management.

Functional Areas

ERP is a business management software is usually a suite of integrated applications that a company can use to collect, store, manage, and interpret data from many functional areas including −

- Financial Accounting − Deals with financial transactions and data.
- Human Resource − Deals with information related to employee of an organization.
- Customer Relationship Management − Deals with capturing and managing customer‘s relationship, facilitating the use of customer experience to evaluate the knowledge database.
- Sales and Distribution − Deals with order placement, delivery, shipment and invoicing.
- Logistics and Warehouse Management − Deals with storage of products and shipment.
- Manufacturing and Material Management − Deals with the production and production planning activities.

- Supply Change Management − Deals with the movement of products, storing, managing, and controlling supplies.
- Business Intelligence − Analyzes data and converts the same to information.

Computers have become so complex and commonplace in organizations, it is much easier to integrate all of the data and processing software modules and hardware into one large unit that is easier to access and control. This is called Enterprise Resource Planning, or ERP. Normally ERP systems use the same database throughout an entire company to store various types of data for different computerized functions. When first developed, ERP systems were used only for large manufacturing companies. Today, they benefit all sizes of companies, even those that are quite small.

Foundation for Understanding ERP Systems:

During early phases of development, integrated solutions were designed for particular process areas such as −

- Material Management − the integrated system was known as Material Requirement Planning (MRP)
- Manufacturing − the integrated system was known as Manufacturing Resource Planning However none of the integrated systems came with a complete solution for an organization covering major business process areas. In early 1990‘s, the Gartner Group first used the acronym ERP. By mid–1990‘s, ERP systems addressed all the core enterprise functions.

In the early stages, most of the ERP solutions were focused on automating back office functions that were not directly affecting customers or general public. Later, front office functions such as customer relationship management and e–business systems were integrated.

1. Microsoft Dynamics
2. Oracle e-Business Suite
3. SAGE
4. SAP Business One
5. Infor Global Solutions
6. NetERP from NetSuite

4.Explain the concept of Decision support systems (DSS)

Decision support systems (DSS) are interactive software-based systems intended to help managers in decision-making by accessing large volumes of information generated from various related information systems involved in organizational business processes, such as office automation system, transaction processing system, etc.

DSS uses the summary information, exceptions, patterns, and trends using the analytical models. A decision support system helps in decision-making but does not necessarily give a decision itself. The decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

Characteristics of a DSS

- ✓ Support for decision-makers in semi-structured and unstructured problems.
- ✓ Support for managers at various managerial levels, ranging from top executive to line managers.
- ✓ Support for individuals and groups. Less structured problems often requires the involvement of several individuals from different departments and organization level.
- ✓ Support for interdependent or sequential decisions.
- ✓ Support for intelligence, design, choice, and implementation.
- ✓ Support for variety of decision processes and styles.
- ✓ DSSs are adaptive over time.

Classification of DSS

There are several ways to classify DSS. Hoi Apple and Whinstone classifies DSS as follows:

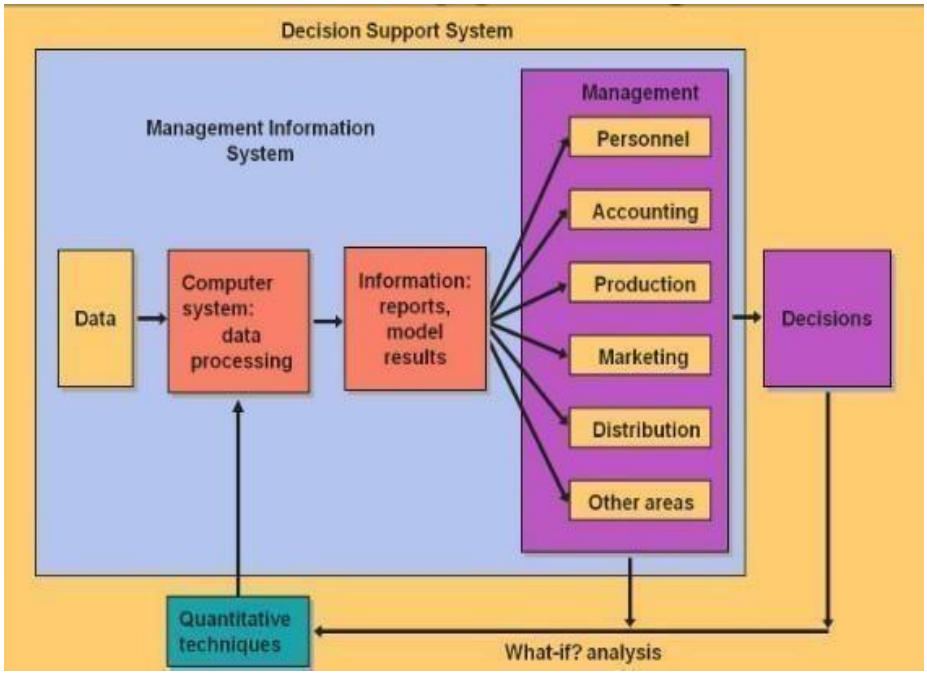
- **Text Oriented DSS:** It contains textually represented information that could have a bearing on decision. It allows documents to be electronically created, revised and viewed as needed.
- **Database Oriented DSS:** Database plays a major role here; it contains organized and highly structured data.
- **Spreadsheet Oriented DSS:** It contains information in spread sheets that allows create, view, modify procedural knowledge and also instructs the system to execute self- contained instructions. The most popular tool is Excel and Lotus 1-2-3.
- **Solver Oriented DSS:** It is based on a solver, which is an algorithm or procedure written for performing certain calculations and particular program type.
- Rules Oriented DSS: It follows certain procedures adopted as rules.
- **Rules Oriented DSS:** Procedures are adopted in rules oriented DSS. Export system is the example.
- **Compound DSS:** It is built by using two or more of the five structures explained above.

Types of DSS

Following are some typical DSS:

- **Status Inquiry System:** It helps in taking operational, management level, or middle level management decisions, for example daily schedules of jobs to machines or machines to operators.
- **Data Analysis System:** It needs comparative analysis and makes use of formula or an algorithm, for example cash flow analysis, inventory analysis etc.
- **Information Analysis System:** In this system data is analyzed and the information report is generated. For example, sales analysis, accounts receivable systems, market analysis etc.
- **Accounting System:** It keeps track of accounting and finance related information, for example, final account, accounts receivables, accounts payables, etc. that keep track of the major aspects of the business.
- **Model Based System:** Simulation models or optimization models used for decision- making are used infrequently and creates general guidelines for operation or management.

Model of Decision Support System:-



5.Explain the concept of Business Intelligence System & Knowledge Management System.

The term 'Business Intelligence' has evolved from the decision support systems and gained strength with the technology and applications like data warehouses, Executive Information Systems and Online Analytical Processing (OLAP).

Business Intelligence System is basically a system used for finding patterns from existing data from operations.

Characteristics of BIS

- ✓ It is created by procuring data and information for use in decision-making.
- ✓ It is a combination of skills, processes, technologies, applications and practices.
- ✓ It contains background data along with the reporting tools.
- ✓ It is a combination of a set of concepts and methods strengthened by fact-based support systems.
- ✓ It is an extension of Executive Support System or Executive Information System.
- ✓ It collects, integrates, stores, analyzes, and provides access to business information
- ✓ It is an environment in which business users get reliable, secure, consistent, comprehensible, easily manipulated and timely information.
- ✓ It provides business insights that lead to better, faster, more relevant decisions.

Benefits of BIS

- ✓ Improved Management Processes.
- ✓ Planning, controlling, measuring and/or applying changes that results in increased revenues and reduced costs.
- ✓ Improved business operations.
- ✓ Fraud detection, order processing, purchasing that results in increased revenues and reduced costs.
- ✓ Intelligent prediction of future.

Knowledge Management System:

A knowledge management system comprises a range of practices used in an organization to identify, create, represent, distribute, and enable adoption to insight and experience.
Such insights and experience comprise knowledge, either embodied in individual or embedded in organizational processes and practices.

Purpose of KMS

- Improved performance
- Competitive advantage
- Innovation
- Sharing of knowledge
- Integration
- Continuous improvement by:
  - ✓ Driving strategy
  - ✓ Starting new lines of business
  - ✓ Solving problems faster
  - ✓ Developing professional skills
  - ✓ Recruit and retain talent

Activities in Knowledge Management

- ✓ Start with the business problem and the business value to be delivered first.
- ✓ Identify what kind of strategy to pursue to deliver this value and address the KM problem.
- ✓ Think about the system required from a people and process point of view.
- ✓ Finally, think about what kind of technical infrastructure are required to support the people and processes.
- ✓ Implement system and processes with appropriate change management and iterative staged release.

UNIT-III
DATABASE MANAGEMENT SYSTEM
2 marks

1.What is mean by Database?

Databases are organized by fields (defined as one information piece), records (defined as a complete set of fields), and files or tables (defined as a collection of records). A collection of information organized in a way that a software program can rapidly find wanted pieces of data—an electronic filing system.

2. Write a short notes on Active Database.

An active Database is a database consisting of a set of triggers. These databases are very difficult to be maintained because of the complexity that arises in understanding the effect of these triggers. In such database, DBMS initially verifies whether the particular trigger specified in the statement that modifies the database is activated or not, prior to executing the statement.

3.Write a short cloud database.

A cloud database is a database that is deployed, delivered, and accessed in the cloud. Cloud databases organize and store structured, unstructured, and semi-structured data just like traditional on-premises databases. However, they also provide many of the same benefits of cloud computing, including speed, scalability, agility, and reduced costs.

4.Listout the Characteristics of DBMS.

- Real-world entity: Modern DBMS are more realistic and uses real world entities to design its architecture. It uses the behavior and attributes too. For example, a school database may use student as entity and their age as their attribute.

- Relation-based tables: DBMS allows entities and relations among them to form as tables. This eases the concept of data saving. A user can understand the architecturof database just by looking at table names etc.

5.What do you mean by Data Model?

Data model tells how the logical structure of a database is modeled. Data Models are fundamental entities to introduce abstraction in DBMS. Data models define how data is connected to each other and how it will be processed and stored inside the system.

The very first data model could be flat data-models where all the data used to be kept in same plane. Because earlier data models were not so scientific they were prone to introduce lots of duplication and update anomalies.

6. Explain the Entity-Relationship Model.

Entity-Relationship model is based on the notion of real-world entities and relationship among them. While formulating real-world scenario into database model, ER Model creates entity set, relationship set, general attributes and constraints. ER Model is best used for the conceptual design of database.

7.Define Relational Model.

The most popular data model in DBMS is Relational Model. It is more scientific model then others. This model is based on first-order predicate logic and defines table as an n-ary relation.

The main highlights of this model are:

- Data is stored in tables called relations.

- Relations can be normalized.

- In normalized relations, values saved are atomic values.

- Each row in relation contains unique value
- Each column in relation contains values from a same domain.

8. What is mean by Database schema?

Database schema skeleton structure of and it represents the logical view of entire database. It tells about how the data is organized and how relation among them is associated. It formulates all database constraints that would be put on data in relations, which resides in database.

A database schema defines its entities and the relationship among them. Database schema is a descriptive detail of the database, which can be depicted by means of schema diagrams. All these activities are done by database designer to help programmers in order to give some ease of understanding all aspect of database.

9.Write short note on Database Instance.

It is important that we distinguish these two terms individually. Database schema is the skeleton of database. It is designed when database doesn't exist at all and very hard to do any changes once the database is operational. Database schema does not contain any data or information.

Database instances, is a state of operational database with data at any given time. This is a snapshot of database. Database instances tend to change with time. DBMS ensures that its every instance (state)

10.HDBMS Hierarchical Database Management System

A hierarchical database model is a data model in which the data is organized into a tree-like structure. The data is stored as records which are connected to one another through links. A record is a collection of fields, with each field containing only one value. The entity type of a record defines which fields the record contains.

11.NDBMS-Network Database Management System

Network Database: A network databases are mainly used on large digital computers. It more connections can be made between different types of data, network databases are considered more efficiency It contains limitations must be considered when we have to use this kind of database. It is Similar to the hierarchical databases; network databases.

12.RDBMS-Relational Database Management System

In relational databases, the relationship between data files is relational. Hierarchical and network databases require the user to pass a hierarchy in order to access needed data. These databases connect to the data in different files by using common data numbers or a key field. Data in relational databases is stored in different access control tables, each having a key field that mainly identifies each row. In the relational databases are more reliable than either the hierarchical or network database structures. In relational databases, tables or files filled up with data are called relations designates a row or record, and columns are referred to as attributes or fields.

13.OODBMS – Object oriented Database Management System

In this Model we have to discuss the functionality of the object oriented Programming .It takes more than storage of programming language objects. Object DBMS's increase the semantics of the C++ and Java .It provides full-featured database programming capability, while containing native language compatibility. It adds the database functionality to object programming languages. This approach is the analogical of the application and database development into a constant data model and language environment. Applications require less code, use more natural data modeling, and code bases are easier to maintain. Object developers can write complete database applications with a decent amount of additional effort.

14.SQL

SQL is Structured Query Language, which is a computer language for storing, manipulating and retrieving data stored in relational database.

SQL is the standard language for Relation Database System. All relational database management systems like MySQL, MS Access, and Oracle, Sybase, Informix, postgres and SQL Server use SQL as standard database language.

15.Why SQL?

- Allows users to access data in relational database management systems.
- Allows users to describe the data.
- Allows users to define the data in database and manipulate that data.
- Allows to embed within other languages using SQL modules, libraries & pre-compilers.
- Allows users to create and drop databases and tables.
- Allows users to create view, stored procedure, functions in a database.

Allows users to set permissions on tables, procedures, and view

16. What is mean by SQL Process?

When you are executing an SQL command for any RDBMS, the system determines the best way to carry out your request and SQL engine figures out how to interpret the task.

There are various components included in the process. These components are Query Dispatcher, Optimization Engines, Classic Query Engine and SQL Query Engine, etc. Classic query engine handles all non-SQL queries but SQL query engine won't handle logical files.

17.What do you mean by SQL command?

The standard SQL commands to interact with relational databases are CREATE, SELECT, INSERT, UPDATE, DELETE and DROP. These commands can be classified into groups based on their nature.

18.Define the Data flow

Inflow- The processes associated with the extraction, cleansing, and loading of the data from the source systems into the data warehouse.

upflow- The process associated with adding value to the data in the warehouse through summarizing, packaging , packaging, and distribution of the data.

downflow- The processes associated with archiving and backing-up of data in the warehouse.

19.What is mean by Tools and Techniques of Data Flow.

The critical steps in the construction of a data warehouse:

- Extraction
- Cleansing
- Transformation

after the critical steps, loading the results into target system can be carried out either by separate products, or by a single, categories:

- code generators
- database data replication tools
- dynamic transformation engines

For the various types of meta-data and the day-to-day operations of the data warehouse, the administration and management tools must be capable of supporting those tasks:

20. What is mean by Data Mart?

A data mart is a simple form of a data warehouse that is focused on a single subject (or functional area), such as sales, finance or marketing. Data marts are often built and controlled by a single department within an organization. Given their single-subject focus, data marts usually draw data from only a few sources. The sources could be internal operational systems, a central data warehouse, or external data.

21. List out the Steps in Implementing a Data Mart.

Simply stated, the major steps in implementing a data mart are to design the schema, construct the physical storage, populate the data mart with data from source systems, access it to make informed decisions, and manage it over time.

- Designing
- Constructing
- Populating
- Accessing
- Managing

22. Explain the Data Mart issues.

- Data mart functionality the capabilities of data marts have increased with the growth in their popularity
- Data mart size the performance deteriorates as data marts grow in size, so need to reduce the size of data marts to gain improvements in performance
- Data mart load performance→two critical components: end-user response time and data loading performance→to increment DB updating so that only cells affected by the change are updated and not the entire MDDB structure.

22. List out the Advantage and Disadvantage of DBMS.

he use of a database management system, or DBMS, to store and manage data has several advantages. These are DBMS's advantages:

Improves the effectiveness of data exchange

With DBMS, data can be exchanged between users more effectively, and access to the data can be restricted so that only authorized users are permitted to view it, as opposed to earlier systems when everyone with access to the system could access the data. We can more easily manage the data in a DBMS.

Heightens Data Protection

Data is now one of the most precious resources available in the modern world. Additionally, the need for data protection becomes even more critical. A large amount of people having access to the database raises the likelihood that the data may be compromised. A simple security layout can be provided by the database management system. Only users with such permissions will be able to view or alter the data, according to limits placed on the information's access by the database administrator. Although it does not guarantee total security, it does offer a solid security design.

Disadvantage of DBMS.

Management scope and complexity

Due to the large range of functions, it offers, the database project's scalability is increased. To create a user interface, it supports many GUIs. It may also be used in conjunction with other potent software. But the complexities of the system as a whole are increased by this entire situation. The process is highly complicated as a result of all these implementations. We need to know other SQL languages to maintain the data and operate the database.

Huge Dimensions

For database management software to work correctly, a lot of disc space is needed. It needs extra software, and that software needs storage space. Gigabytes of space may be needed for the whole DBMS configuration.

23.List out the Application of DBMS.

1. **Railway Reservation System –**
   In the rail route reservation framework, the information base is needed to store the record or information of ticket appointments, status about train's appearance, and flight. Additionally, if trains get late, individuals become acquainted with it through the information base update.

2. **Library Management System –**
   There are lots of books in the library so; it is difficult to store the record of the relative multitude of books in a register or duplicate. Along these lines, the data set administration framework (DBMS) is utilized to keep up all the data identified with the name of the book, issue date, accessibility of the book, and its writer.

3. **Banking –**
   Database the executive's framework is utilized to store the exchange data of the client in the information base.

4. **Education Sector –**
   Presently, assessments are led online by numerous schools and colleges. They deal with all assessment information through the data set administration framework (DBMS). In spite of that

understudy's enlistments subtleties, grades, courses, expense, participation, results, and so forth all the data is put away in the information base.

24.Difference between File system and DBMS.

Basics	File System	DBMS
Structure	The file system is a way of arranging the files in a storage medium within a computer.	DBMS is software for managing the database.
Data Redundancy	Redundant data can be present in a file system.	In DBMS there is no redundant data.
Backup and Recovery	It doesn't provide Inbuilt mechanism for backup and recovery of data if it is lost.	It provides in house tools for backup and recovery of data even if it is lost.
Query processing	There is no efficient query processing in the file system.	Efficient query processing is there in DBMS.

25. Why is RDBMS Required?

RDBMS on the other hand is a type of DBMS, as the name suggests it deals with relations as well as various key constraints. So here we have tables which are called schema and we have rows which are called tuples. It also aids in the reduction of data redundancy and the preservation of database integrity. Relational Database Management System is an **advanced** version of a DBMS.

13 MARKS

1.Difference between DBMS and RDBMS.

DBMS	RDBMS
DBMS stores data as file.	RDBMS stores data in tabular form.
Data elements need to access individually.	Multiple data elements can be accessed at the same time.
No relationship between data.	Data is stored in the form of tables which are related to each other.
Normalization is not present.	Normalization is present.
DBMS does not support distributed database.	RDBMS supports distributed database.
It stores data in either a navigational or hierarchical form.	It uses a tabular structure where the headers are the column names, and the rows contain corresponding values.

DBMS	RDBMS
It deals with small quantity of data.	It deals with large amount of data.
Data redundancy is common in this model.	Keys and indexes do not allow Data redundancy.
It is used for small organization and deal with small data.	It is used to handle large amount of data.
Not all Codd rules are satisfied.	All 12 Codd rules are satisfied.
Security is less	More security measures provided.
It supports single user.	It supports multiple users.
Data fetching is slower for the large amount of data.	Data fetching is fast because of relational approach.
The data in a DBMS is subject to low security levels with regards to data manipulation.	There exists multiple levels of data security in a RDBMS.
Low software and hardware necessities.	Higher software and hardware necessities.
Examples: XML, Window Registry, Forxpro, dbaseIIIplus etc.	Examples: MySQL, PostgreSQL, SQL Server, Oracle, Microsoft Access etc.

2.Explain about the concepts DBMS – Architecture.

The design of a Database Management System highly depends on its architecture. It can be centralized or decentralized or hierarchical. DBMS architecture can be seen as single tier or multi-tier. n-tier architecture divides the whole system into related but independent n modules, which can be independently modified, altered, changed or replaced.

In 1-tier architecture, DBMS is the only entity where user directly sits on DBMS and uses it. Any changes done here will directly be done on DBMS itself. It does not provide handy tools for end users

and preferably database designer and programmers use single tier architecture.

If the architecture of DBMS is 2-tier then must have some application, which uses the DBMS. Programmers use 2-tier architecture where they access DBMS by means of application. Here application tier is entirely independent of database in term of operation, design and programming.

3-tier architecture

Most widely used architecture is 3-tier architecture. 3-tier architecture separates it tier from each other on basis of users. It is described as follows:

- Database (Data) Tier: At this tier, only database resides. Database along with its query processing languages sits in layer-3 of 3-tier architecture. It also contains all relations and their constraints.
- Application (Middle) Tier: At this tier the application server and program, which access database, resides. For a user this application tier works as abstracted view of database. Users are unaware of any existence of database beyond application. For database-tier, application tier is the user of it. Database tier is not aware of any other user beyond application tier. This tier works as mediator between the two.
- User (Presentation) Tier: An end user sits on this tier. From a users aspect this tier is everything. He/she doesn't know about any existence or form of database beyond this layer. At this layer multiple views of database can be provided by the application. All views are generated by applications, which reside in application tier.

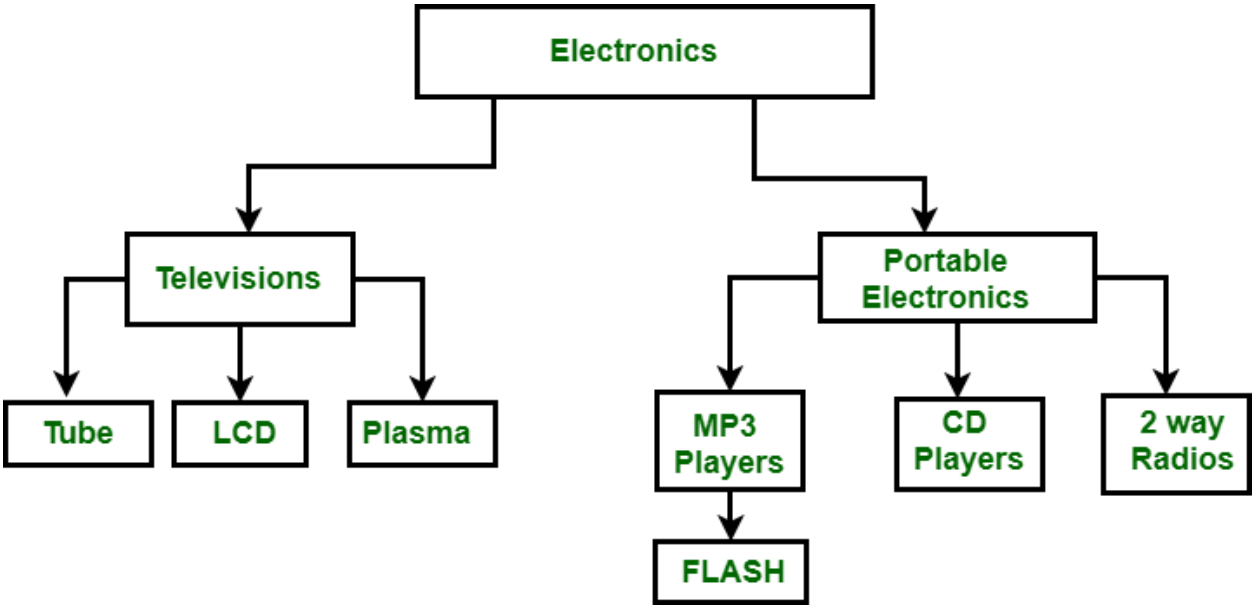
Multiple tier database architecture is highly modifiable as almost all its components are independent and can be changed independently.

3.Difference between Hierarchical and Network Data Model.

Hierarchical Data Model:

Hierarchical data model is the oldest type of the data model. It was developed by IBM in 1968. It organizes data in the tree-like structure. Hierarchical model consists of the following :

- It contains nodes which are connected by branches.
- The topmost node is called the root node.
- If there are multiple nodes appear at the top level, then these can be called as root segments.
- Each node has exactly one parent.
- One parent may have many child.



In the above figure, Electronics is the root node which has two children i.e. Televisions and Portable Electronics. These two has further children for which they act as parent. For example: Television has children as Tube, LCD and Plasma, for these three Television act as parent. It follows one to many relationships.

2.NetworkDataModel:

It is the advance version of the hierarchical data model. To organize data it uses directed graphs instead of the tree-structure. In this child can have more than one parent. It uses the concept of the two data structures i.e. Records and Sets.

Project is the root node which has two children i.e. Project 1 and Project 2. Project 1 has 3 children and Project 2 has 2 children. Total there are 5 children i.e Department A, Department B and Department C, they are network related children as we said that this model can have more than one parent. So, for the Department B and Department C have two parents i.e. Project 1 and Project 2.

3.Difference between Hierarchical Data Model and Network Data Model :

S. No.	Hierarchical Data Model	Network Data Model
1.	In this model, to store data hierarchy method is used.	In this model, you could create a network that shows how data is related to each other.
2.	It implements 1:1 and 1:n relations.	It implements 1:1, 1:n and also many to many relations.
3.	To organize records, it uses tree structure.	To organize records, it uses graphs.
4.	Records are linked with the help of pointers.	Records are linked with the help of linked list.
5.	Insertion anomaly exits in this model i.e. child node cannot be inserted without the parent node.	There is no insertion anomaly.
6.	Deletion anomaly exists in this model i.e. it is difficult	There is no deletion anomaly.

S. No.	Hierarchical Data Model	Network Data Model
	to delete the parent node.	
7.	It is used to access the data which is complex and asymmetric.	It is used to access the data which is complex and symmetric.
8.	When update operation is performed, it suffers from inconsistency problem because of the existence of multiple instances of child records.	No such problem exists because of the single occurrence of records while updating.
9.	This model lacks data independence.	There is partial data independence in this model.
10.	Less flexible in comparison to the relational model.	It is flexible.
11.	When you are searching for a record then firstly you need to visit parent record before retrieving a child record.	Searching for a record is easy because of the availability of multiple access paths to reach data item.
12.	Example- IBM's IMS (Information Management System) implement this model.	Example- Oracle. SQL Server, Sybase DBMS implement this model.

4. Explain about the Components of Data Warehouse.

Data Warehouse is used to store historical data which helps to make strategic decisions for the business. It is used for Online Analytical Processing (OLAP) which helps to analyze the data. The data warehouse contributes to business executives in systematically organizing, accepting, and using their data to make strategic decisions.

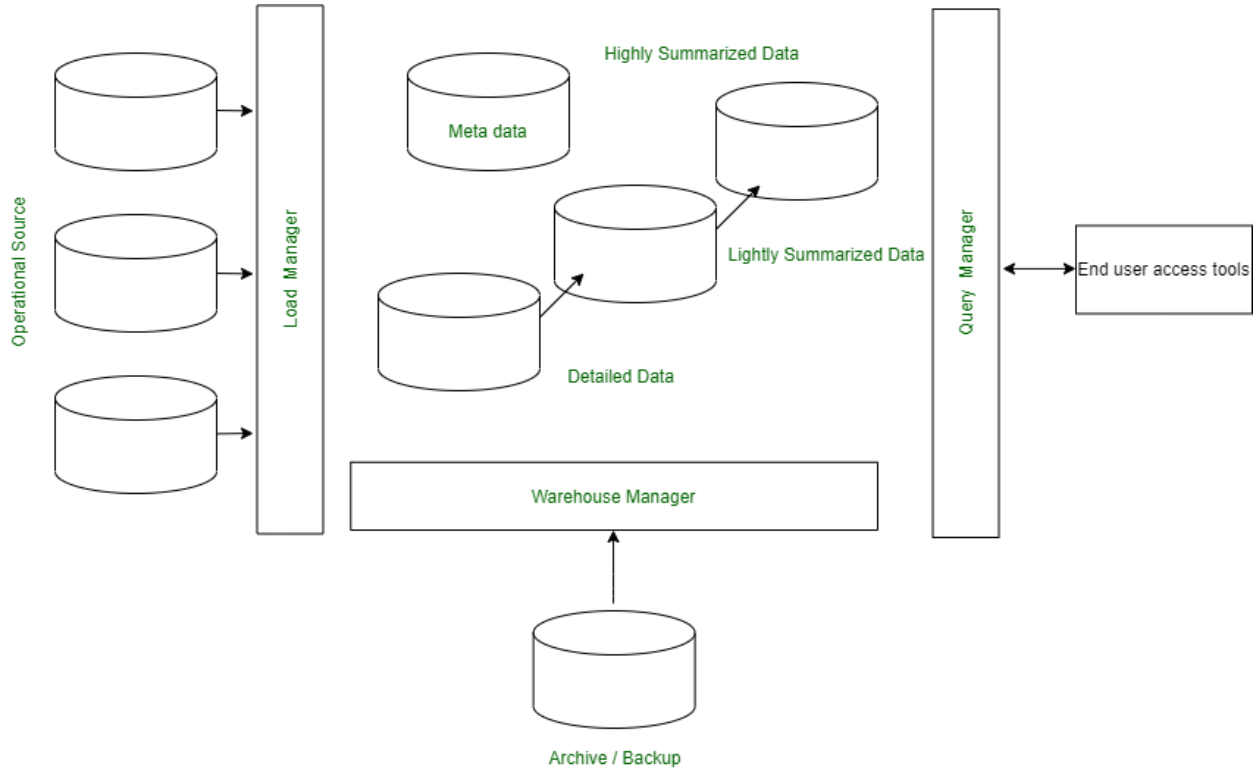
Data Warehouse has been defined in many ways, making it difficult to formulate a rigorous definition. Gradually speaking, a data warehouse is a data repository that is kept separate from an organization's operational database. Data warehouse systems allow the integration of a wide variety of application systems. They support information processing by providing a solid plan of aggregated historical data for analysis.

Data in a data warehouse comes from the organization's operational systems as well as other external sources. These are collectively referred to as the source systems. The data extracted from the source systems is stored in an area called the data staging area, where the data is cleaned, transformed, assembled, and duplicated to prepare the data in the data warehouse.

The data staging area is usually a set of machines where simple activities like sorting and sequential processing take place. The data staging area does not provide as soon as possible a system provides query or presentation services, it is classified as a presentation server. A presentation server is the destination machine on which data is loaded from the data staging area and directly stored for query by end-users, report authors, and other applications.

There are three different types of systems required for a data warehouse –

1. Source Systems
2. Data Staging Area
3. Presentation Server



\

he data moves from the data source area through the staging area to the presentation server. The entire process is better known as ETL (extract, transform, and load) or ETT (extract, transform, and transfer).

Components of Data Warehouse Architecture and their tasks :

1. Operational Source –

- An operational Source is a data source consists of Operational Data and External Data.
- Data can come from Relational DBMS like Informix, Oracle.

2. Load Manager –

- The Load Manager performs all operations associated with the extraction of loading data in the data warehouse.
- These tasks include the simple transformation of data to prepare data for entry into the warehouse.

3. Warehouse Manage –

- The warehouse manager is responsible for the warehouse management process.
- The operations performed by the warehouse manager are the analysis, aggregation, backup and collection of data, de-normalization of the data.

4. Query Manager –

- Query Manager performs all the tasks associated with the management of user queries.
- The complexity of the query manager is determined by the end-user access operations tool and the features provided by the database.

5. Detailed Data –

- It is used to store all the detailed data in the database schema.
- Detailed data is loaded into the data warehouse to complement the data collected.

6. Summarized Data –

- Summarized Data is a part of the data warehouse that stores predefined aggregations
- These aggregations are generated by the warehouse manager.

7. Archive and Backup Data –

- The Detailed and Summarized Data are stored for the purpose of archiving and backup.
- The data is relocated to storage archives such as magnetic tapes or optical disks.

8. Metadata –

- Metadata is basically data stored above data.
- It is used for extraction and loading process, warehouse, management process, and query management process.

9. End User Access Tools –

- End-User Access Tools consist of Analysis, Reporting, and mining.
- By using end-user access tools users can link with the warehouse.

5.Advantages and disadvantages of the components commonly found in data warehouses:

Data sources: Data sources are the systems or databases that provide data to the data warehouse. Advantages of using multiple data sources include increased data coverage and the ability to integrate diverse data types. However, disadvantages include potential data quality issues, data inconsistencies, and increased complexity in data integration.

ETL (Extract, Transform, Load) processes: ETL processes are used to extract data from source systems, transform it to conform to the data warehouse schema, and load it into the data warehouse. Advantages of ETL processes include efficient data integration and improved data quality. However, disadvantages include potential data loss or corruption, increased processing time and complexity, and potential data inconsistency due to data transformations.

Data storage: Data storage is the component of the data warehouse that stores the data. Advantages of data storage in a data warehouse include the ability to store large amounts of data in a single location, fast and efficient data retrieval, and improved data quality due to data cleansing and standardization. Disadvantages include the high cost of data storage, potential data loss or corruption, and potential security risks associated with storing large amounts of sensitive data in a single location.

Data modeling: Data modeling is the process of designing the structure of the data warehouse. Advantages of data modeling include the ability to organize and structure data in a way that is optimized for BI activities, improved data quality due to data cleansing and standardization, and increased scalability and flexibility. However, disadvantages include the potential for complex data relationships and the need for specialized skills and knowledge to design and implement an effective data model.

Data access tools: Data access tools are used to access and analyze data in the data warehouse. Advantages of data access tools include the ability to easily access and analyze data, improved data quality due to data cleansing and standardization, and increased speed and efficiency of BI activities. Disadvantages include the potential for user error, the need for specialized skills and knowledge to use the tools effectively, and potential security risks associated with data access.

UNIT -IV

2 MARKS

1. **What is mean by Information security?**

Information security, sometimes shortened to Info Sec, is the practice of defending information from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction. It is a general term that can be used regardless of the form the data may take (electronic, physical, etc.)

2.Explain the IT security

Sometimes referred to as computer security, Information Technology Security is information security applied to technology (most often some form of computer system). It is worthwhile to note that

a computer does not necessarily mean a home desktop. A computer is any device with a processor and some memory. Such devices can range from non-networked standalone devices as simple as calculators, to networked mobile computing devices such as smart phones and tablet computers. IT security specialists are almost always found in any major enterprise/establishment due to the nature and value of the data within larger businesses. They are responsible for keeping all of the technology within the company secure from malicious cyber attacks that often attempt to breach into critical private information or gain control of the internal systems.

3.What is mean by Decision Support System?

A decision support system (DSS) is a computer program application used to improve a company's decision-making capabilities. It analyzes large amounts of data and presents an organization with the best possible options available.

Decision support systems bring together data and knowledge from different areas and sources to provide users with information beyond the usual reports and summaries. This is intended to help people make informed decisions.

4.Explain about the IDSS.

Intelligent decision support system (IDSS)

Users can also bake artificial intelligence (AI) into decision support systems. Called intelligent decision support systems (IDSS), the AI mines and processes large amounts of data to get insights and make recommendations for better decision-making. It does this by analyzing multiple sources of data and identifying patterns, trends and associations to emulate human decision-making capabilities.

Designed to act similar to a human consultant, an IDSS gathers and analyzes data to support decision-makers by identifying and troubleshooting issues, and providing and evaluating possible solutions. The AI component of the DSS emulates human capabilities as closely as possible, while more efficiently processing and analyzing information as a computer system.

5.What are the major steps involved in Decision Support System?

steps, including the following seven steps:

1) Confirm user requirements;

2) Systems analysis;

3) System design;

4) Programming;

5) Testing; \

6) Implementation; and

7) Use and Evaluation.

6.List out the advantage and disadvantage of Decision Support System.

Advantage of Decision Support System

Fast:

DSS is a fast method for taking decisions. Computers give us results fast. The data we need is displayed on the screen within a few minutes. We have to just take decisions overselves after getting data from the computer software.

Automation:

If you want to reward any customer then you don't need to worry. The software will know which consumer buy most of the company products and you will give them a 50% discount on their next purchase. So it automates the process of decision making.

Efficient:

It is an efficient method. There are fewer chances that computerized data may be wrong. Computers always extract the data that we feed to them. If we feed relevant data then it will output data that is accurate.

Disadvantages of Decision Support System

Limited skills:

If the management of the company gets all the data prepared by the system then they don't do any research by themselves. I mean they will do less mental things. Their brain will become limited. Their skills will be not polished.

Blame computer:

If any staff make mistake then he will directly blame the computer. He will tell that his computer is not working that is why I am not giving a result.

Machine dependent:

All the data is kept in the computer machine. So the CEO will be bound to the machine. He cannot decide without investigating data from the machine.

7.what is mean by Social media?

Social media is a collective term for websites and applications that focus on communication, community-based input, interaction, content-sharing and collaboration. People use social media to stay in touch and interact with friends, family and various communities.

8.Listout the Characteristics of of Social media.

1. **Webspace**
   The website should provide the users free web space to upload content.
2. **Webaddress**
   The users are given a unique web address that becomes their web identity. They can post and share all their content on this web address.
3. **Buildprofiles**
   Users are is asked to enter personal details like name, address, date of birth, school/college education, professional details etc. The site then mines the personal data to connect indiiduals.
4. **Connectwithfriends**
   Users are encouraged to post personal and professional updates about themselves. The site then becomes a platform to connect friends and relatives.
5. **Uploadcontentinrealtime**
   Users are provided the tools to post content in real time. This content can be text, images, audio, video or even symbolic likes and dislikes.The last post comes first, giving the site freshness.

9.Explain the Security governance.

The Software Engineering Institute at Carnegie Mellon University, in a publication titled "Governing for Enterprise Security (GES)", defines characteristics of effective security governance. These include:

- An enterprise-wide issue
- Leaders are accountable
- Viewed as a business requirement
- Risk-based
- Roles, responsibilities, and segregation of duties defined
- Addressed and enforced in policy
- Adequate resources committed
- Staff aware and trained
- A development life cycle requirement
- Planned, managed, measurable, and measured
- Reviewed and audited

10. What is mean by System testing?

System testing of software or hardware is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. System testing falls within the scope of black box testing, and as such, should require no knowledge of the inner design of the code or logic.

As a rule, system testing takes, as its input, all of the "integrated" software components that have passed integration testing and also the software system itself integrated with any applicable hardware system(s). The purpose of integration testing is to detect any inconsistencies between the software units that are integrated together (called assemblages) or between any of the assemblages and the hardware. System testing is a more limited type of testing; it seeks to detect defects both within the "inter-assemblages" and also within the system as a whole.

11.Explain the Testing the whole system.

System testing is performed on the entire system in the context of a Functional Requirement Specification(s) (FRS) and/or a System Requirement Specification (SRS). System testing tests not only the design, but also the behavior and even the believed expectations of the customer. It is also intended to test up to and beyond the bounds defined in the software/hardware requirements specification(s).

12.What is mean by Error detection schemes?

Error detection is most commonly realized using a suitable hash function (or checksum algorithm). A hash function adds a fixed-length tag to a message, which enables receivers to verify the delivered message by recomputing the tag and comparing it with the one provided.

There exists a vast variety of different hash function designs. However, some are of particularly widespread use because of either their simplicity or their suitability for detecting certain kinds of errors (e.g., the cyclic redundancy check's performance in detecting burst errors).

13.Define the Cybercrime

Cybercrime is any criminal activity that involves a computer, networked device or a network. While most cybercrimes are carried out in order to generate profit for the cybercriminals, some cybercrimes are carried out against computers or devices directly to damage or disable them.

14.List out the advantages and Disadvantages

Advantages:

- It helps automate various tasks that cannot be done manually.
- It helps organize data and information in a better way and it has much more computing and calculating power than human.
- It may be the storage of important data and files.

Disadvantages:

- It may damage your studies and social life.
- The way it distracts can deviate our thoughts and activities towards unproductive activities.
- It could cause violation of privacy.

15.What is mean by Hacking?

A commonly used hacking definition is the act of compromising digital devices and networks through unauthorized access to an account or computer system. Hacking is not always a malicious act, but it is most commonly associated with illegal activity and data theft by cyber criminals.

16. Black Hat Hackers

Black hat hackers are the "bad guys" of the hacking scene. They go out of their way to discover vulnerabilities in computer systems and software to exploit them for financial gain or for more malicious purposes, such as to gain reputation, carry out corporate espionage, or as part of a nation-state hacking campaign.

These individuals' actions can inflict serious damage on both computer users and the organizations they work for. They can steal sensitive personal information, compromise computer and financial systems, and alter or take down the functionality of websites and critical networks.

17. White Hat Hackers

White hat hackers can be seen as the “good guys” who attempt to prevent the success of black hat hackers through proactive hacking. They use their technical skills to break into systems to assess and test the level of network security, also known as ethical hacking. This helps expose vulnerabilities in systems before black hat hackers can detect and exploit them.

The techniques white hat hackers use are similar to or even identical to those of black hat hackers, but these individuals are hired by organizations to test and discover potential holes in their security defenses.

18. Grey Hat Hackers

Grey hat hackers sit somewhere between the good and the bad guys. Unlike black hat hackers, they attempt to violate standards and principles but without intending to do harm or gain financially. Their actions are typically carried out for the common good. For example, they may exploit a vulnerability to raise awareness that it exists, but unlike white hat hackers, they do so publicly. This alerts malicious actors to the existence of the vulnerability.

19. A computer virus is a type of malicious software, or malware, that spreads between computers and causes damage to data and software. Computer viruses aim to disrupt systems, cause major operational issues, and result in data loss and leakage.

20. Cybertheft occurs when a criminal uses the internet to steal the personal or financial data of a victim with the intent to use that information for criminal purposes.

21.what is mean by **computer worm** ?

A **computer worm** is a standalone malware computer program that replicates itself in order to spread to other computers.[1] It often uses a computer network to spread itself, relying on security failures on the target computer to access it. It will use this machine as a host to scan and infect other computers. When these new worm-invaded computers are controlled, the worm will continue to scan and infect other computers using these computers as hosts, and this behaviour will continue.[2] Computer worms use recursive methods to copy themselves without host programs and distribute themselves based on exploiting the advantages of exponential growth, thus controlling and infecting more and more computers in a short time.[3] Worms almost always cause at least some harm to the network, even if only by consuming bandwidth, whereas viruses almost always corrupt or modify files on a targeted computer.

Many worms are designed only to spread, and do not attempt to change the systems they pass through. However, as the Morris worm and Mydoom showed, even these "payload-free" worms can cause major disruption by increasing network traffic and other unintended effects.

22. Hybrid schemes

Hybrid ARQ is a combination of ARQ and forward error correction. There are two basic approaches:

- Messages are always transmitted with FEC parity data (and error-detection redundancy). A receiver decodes a message using the parity information, and requests retransmission using ARQ only if the parity data was not sufficient for successful decoding (identified through a failed integrity check).
- Messages are transmitted without parity data (only with error-detection information). If a receiver detects an error, it requests FEC information from the transmitter using ARQ, and uses

it to reconstruct the original message.

23. Discuss about IS Vulnerability

In computer security, vulnerability is a weakness which allows an attacker to reduce a system's information assurance. Vulnerability is the intersection of three elements: a system susceptibility or flaw, attacker access to the flaw, and attacker capability to exploit the flaw. To exploit vulnerability, an attacker must have at least one applicable tool or technique that can connect to a system weakness. In this frame, vulnerability is also known as the attack surface.

Vulnerability management is the cyclical practice of identifying, classifying, remediating, and mitigating vulnerabilities. This practice generally refers to software vulnerabilities in computing systems.

A security risk may be classified as vulnerability. The use of vulnerability with the same meaning of risk can lead to confusion. The risk is tied to the potential of a significant loss. Then there are vulnerabilities without risk: for example when the affected asset has no value. Vulnerability with one or more known instances of working and fully implemented attacks is classified as an exploitable vulnerability a vulnerability for which can exploit exists. The window of vulnerability is the time from when the security hole was introduced or manifested in deployed software, to when access was removed, a security fix was available/deployed, or the attackers was disabled see zero-day attack.

24. Data and Computer Security

Dictionary of standards concepts and terms, authors Dennis Longley and Michael Shain, Stockton Press, ISBN 0-935859-17-9, defines vulnerability as:

1) In computer security, a weakness in automated systems security procedures, administrative controls, Internet controls, etc., that could be exploited by a threat to gain unauthorized access to information or to disrupt critical processing.

2) In computer security, a weakness in the physical layout, organization, procedures, personnel, management, administration, hardware or software that may be exploited to cause harm to the ADP system or activity.

3) In computer security, any weakness or flaw existing in a system. The attack or harmful event, or the opportunity available to a threat agent to mount that attack.

25. But what is hacking in a cyber security context?

Hacking in cyber security refers to the misuse of devices like computers, smartphones, tablets, and networks to cause damage to or corrupt systems, gather information on users, steal data and documents, or disrupt data-related activity.

A traditional view of hackers is a lone rogue programmer who is highly skilled in coding and modifying computer software and hardware systems. But this narrow view does not cover the true technical nature of hacking. Hackers are increasingly growing in sophistication, using stealthy attack methods designed to go completely unnoticed by cybersecurity software and IT teams.

13 MARKS

2. Elaborate the concept of Vulnerability and risk factor models

A resource (either physical or logical) may have one or more vulnerabilities that can be exploited by a threat agent in a threat action. The result can potentially compromise the confidentiality, integrity or availability of resources (not necessarily the vulnerable one) belonging to an organization and/or others parties involved (customers, suppliers).
The so-called CIA triad is the basis of Information Security.

An attack can be active when it attempts to alter system resources or affect their operation, compromising integrity or availability. A "passive attack" attempts to learn or make use of information from the system but does not affect syem resources, compromising confidentiality.

OWASP: relationship between threat agent and business impact OWASP depicts the same phenomenon in slightly different terms: a threat agent through an attack vector exploits a weakness (vulnerability) of the system and the related security controls, causing a technical impact on an IT resource (asset) connected to a business impact.

3. Explain about the Protect Yourself Against Hacking

There are further steps that users and organizations can take to protect themselves against the threat of hacking.

Download from First-party Sources

Only download applications or software from trusted organizations and first-party sources. Downloading content from unknown sources means users do not fully know what they are accessing, and the software can be infected with malware, viruses, or Trojans.

Install Antivirus Software

Having antivirus software installed on devices is crucial to spotting potential malicious files, activity, and bad actors. A trusted antivirus tool protects users and organizations from the latest malware, spyware, and viruses and uses advanced detection engines to block and prevent new and evolving threats.

Use a VPN

Using a virtual private network (VPN) allows users to browse the internet securely. It hides their location and prevents hackers from intercepting their data or browsing activity.

Do Not Login as an Admin by Default

"Admin" is one of the most commonly used usernames by IT departments, and hackers use this information to target organizations. Signing in with this name makes you a hacking target, so do not log in with it by default.

Use a Password Manager

Creating strong, unique passwords is a security best practice, but remembering them is difficult. Password managers are useful tools for helping people use strong, hard-to-crack passwords without having to worry about remembering them.

Use Two-factor Authentication

Two-factor authentication (2FA) removes people's reliance on passwords and provides more certainty that the person accessing an account is who they say they are. When a user logs in to their account, they are then prompted to provide another piece of identity evidence, such as their fingerprint or a code sent to their device.

Brush Up on Anti-phishing Techniques

Users must understand the techniques that hackers deploy to target them. This is especially the case with antiphishing and ransomware, which help users know the telltale signs of a phishing email or a ransomware attack or ransomware settlements.

3.What are the Types of Computer Viruses?

Every computer virus has a payload that performs an action. The threat actor can code any malicious activity into the virus payload, including simple, innocuous pranks that don't do any harm. While a few viruses have harmless payloads, most of them cause damage to the system and its data. There are nine main virus types, some of which could be packaged with other malware to increase the chance of infection and damage. The nine major categories for viruses on computers are:

Boot Sector Virus

Your computer drive has a sector solely responsible for pointing to the operating system so that it can boot into the interface. A boot sector virus damages or controls the boot sector on the drive, rendering the machine unusable. Attackers usually use malicious USB devices to spread this computer virus. The virus is activated when users plug in the USB device and boot their machine.

Web Scripting Virus

Most browsers have defenses against malicious web scripts, but older, unsupported browsers have vulnerabilities allowing attackers to run code on the local device.

Browser Hijacker

A computer virus that can change the settings on your browser will hijack browser favorites, the home page URL, and your search preferences and redirect you to a malicious site. The site could be a phishing site or an adware page used to steal data or make money for the attacker.

Resident Virus

A virus that can access computer memory and sit dormant until a payload is delivered is considered a resident virus. This malware may stay dormant until a specific date or time or when a user performs an action.

Direct Action Virus

When a user executes a seemingly harmless file attached to malicious code, direct-action viruses deliver a payload immediately. These computer viruses can also remain dormant until a specific action is taken or a timeframe passes.

Polymorphic Virus

Malware authors can use polymorphic code to change the program's footprint to avoid detection. Therefore, it's more difficult for an antivirus to detect and remove them.

File Infector Virus

To persist on a system, a threat actor uses file infector viruses to inject malicious code into critical files that run the operating system or important programs. The computer virus is activated when the system boots or the program runs.

Multipartite Virus

These malicious programs spread across a network or other systems by copying themselves or injecting code into critical computer resources.

Macro Virus

Microsoft Office files can run macros that can be used to download additional malware or run malicious code. Macro viruses deliver a payload when the file is opened and the macro runs.

4. What Causes Computer Viruses? How Do Computer Viruses Work?

Computer viruses are standard programs; instead of offering useful resources, these programs can damage your device. Computer viruses are typically crafted by hackers with various intentions, like stealing sensitive data to causing chaos in systems. Some hackers create these malicious programs for fun or as a challenge, while others have more sinister motives like financial gain or cyber warfare.

Hackers may exploit weak points in an operating system or app to acquire unapproved access and power over a user's machine to achieve their goals.

- **Ego-driven:** Some virus authors seek fame within the hacker community by creating destructive or widespread viruses that garner media attention.
- **Cybercrime:** Hackers often use computer viruses as tools for ransomware attacks, identity theft, and other forms of online fraud.

- **Sabotage:** In some cases, disgruntled employees create computer viruses to intentionally damage their employer's infrastructure.
- **Cyber espionage:** State-sponsored hackers may develop advanced persistent threats (APTs) using custom-made malware designed for long-term infiltration into targeted networks.

For a threat actor to execute a virus on your machine, you must initiate execution. Sometimes, an attacker can execute malicious code through your browser or remotely from another network computer. Modern browsers have defenses against local machine code execution, but third-party software installed on the browser could have vulnerabilities that allow viruses to run locally.

The delivery of a computer virus can happen in several ways. One common method is via a phishing email. Another technique is hosting malware on a server that promises to provide a legitimate program. It can be delivered using macros or by injecting malicious code into legitimate software files.

At their core, computer viruses are discreet programs that hitch a ride on other files or applications. In most cases, their primary objective is to replicate and spread like wildfire.

Computer viruses function as malicious software programs designed to infect other programs by modifying them in some way. In doing so, a virus will attach itself to an unsuspecting file or application in order to spread.

The Infection Process

A virus can attach itself to any legitimate program or document that supports macros to execute its code, such as an email attachment or a file download from a website. Once the file is opened or downloaded, the virus springs into action and starts executing.

Hiding in Plain Sight

Computer viruses can be quite crafty to remain hidden from both users and antivirus software alike. Viruses employ stealth techniques such as polymorphism, which changes their appearance, or encryption methods.

The Damage Done

Once activated, a virus may wreak havoc on your computer system. It can steal sensitive data, corrupt files, slow down performance, and even crash your entire system. It can spread from system to system after a user takes action that either intentionally or accidentally facilitates it.

It's important to note that viruses are just one type of malware, and many other types of malicious software can harm your computer or steal your personal information.

5.Explain about the types of social media.

Types of social media

1. Social networking
2. Photo and image sharing
3. Video sharing
4. Audio sharing
5. Live streaming

6. Social messaging
7. Disappearing content apps
8. Social shopping networks
9. Interactive social media apps
10. Discussion forums
11. Microblogging platforms
12. Community blogging sites
13. Social review sites
14. Social curation and bookmarking sites

1. Social networking sites

Social networking sites allow people to connect with each other through a shared online space. Users can like, share, comment on posts and follow other users and businesses.

For brands, social media networking sites offer an opportunity to build awareness, **create a community** of customers and followers and drive traffic to websites. By creating informative and engaging content, brands can cultivate relationships with customers and followers that lead to conversions.

Examples: Facebook, LinkedIn, Instagram, Twitter, TikTok and Snapchat

How brands can use social networking sites:

- Post, share and respond to audience content
- Directly connect with others. Whether as friends or fans, an engaged social following signals clout for marketers and brands alike
- Form communities and discuss relevant news within them

2. Photo and image sharing sites:

Platforms like Instagram, which has **more than 1 billion monthly active users**, have made it easier than ever before to curate and share photos and images. Brands looking to implement this type of social media marketing should focus on high-quality, creative visuals that tell a story.

Examples: Instagram, Snapchat, Pinterest and Imgur

How brands can use photo and image sharing sites:

- Post high-quality, creative images that illustrate your brand values
- Curate and promote user-generated content via branded hashtags
- Engage with customers and followers in real time

3. Video sharing sites

Overview: Half of all **social media users say they prefer video** to any other kind of content. Much like image-based social sites, video hubs like YouTube, TikTok and Vimeo are attracting visitors in droves via visual content.

Why is video so popular? Well, video content requires less effort for viewers to absorb. There's no reading or no scrolling, just watching. Not to mention, videos are optimal for educating your audience. How-to's and tutorials are the cornerstones of social video content.

Examples: YouTube, TikTok and Vimeo

How brands can use video sharing sites:

- Use video to demonstrate how your product or service works
- Share customer testimonials and success stories
- Create helpful how-to guides and tutorials related to your industry
- Highlight company culture with behind-the-scenes footage

4. Audio sharing sites

Overview: **Audio sharing sites** are a type of social media that became popular during the COVID-19 pandemic. Stuck at home with Zoom fatigue, people were looking for an easier way to consume content, and audio-only proved to be the solution.

Social apps like Clubhouse offer users a unique way to connect with others and share ideas. This type of social media is still in its early days but shows a lot of promise for the future.

Examples: Clubhouse, Twitter Spaces and Facebook Live Audio Rooms

How brands can use audio sharing sites:

- Share behind-the-scenes content, like interviews with employees and company leaders
- Host live events and Q&A events with customers or experts in your industry
- Take listeners on a journey by sharing audio stories or vignettes

5. Live streaming apps

apps allow users to share real-time video with their followers. This content is often unedited and authentic, giving viewers a special behind-the-scenes glimpse into the life of the person streaming.

The live streaming market is booming, with more than **482 billion hours watched** in 2020 alone. Stream everything from concerts to eSports, product launches and beyond.

Examples: YouTube Live, Facebook Live, Twitch and UStream

How brands can use live streaming apps:

- Give viewers a candid look at your brand
- Build anticipation for upcoming products or events with live teasers
- Increase sales by offering exclusive deals and discounts to viewers tuning in live

6. Social messaging apps

Social messaging apps are a type of social media that allows users to communicate in real time. One of the most popular messaging apps—WhatsApp— has more than **200 billion monthly users**!

While they aren't traditionally thought of as a marketing tool, **messaging apps like WhatsApp** can be a powerful way to reach and engage with your target audience. Brands can use them to provide customer service, product recommendations and even to make sales.

Examples: Facebook Messenger, Twitter DMs, Google Business Messenger, WhatsApp and WeChat

How brands can use social messaging apps:

- Use chatbots to answer customer questions
- Send out automated coupon codes or discount offers
- Create a private group for loyal customers and followers
- Use **Smart Inbox** to monitor all incoming messages and conversations in one place

7. Disappearing content, also known as ephemeral content, refers to content that only exists for a short period of time before it expires or is no longer available. Snapchat popularized this format, but now other platforms like Instagram, Facebook and WhatsApp offer similar features.

Disappearing content is a great way to add excitement and urgency to your marketing campaigns. It can also help you connect with younger audiences who tend to flock to this type of social media. Instagram Stories alone have more than 500 million daily active users.

Examples: Snapchat, Instagram Stories and Facebook Stories

How brands can use disappearing content apps:

- Promote time-sensitive sales and discounts
- Encourage your audience to share their own disappearing content
- Create behind-the-scenes content to give your audience a peek into your brand

8. Social shopping networks

Overview: Social shopping has become increasingly popular in recent years. Most social media platforms now allow users to browse and purchase products without ever leaving their app.

This a convenient way for consumers to shop, and it provides brands with a unique opportunity to sell their products directly to their target audience. Considering that 60% of people say they find new products on Instagram, and 75% of Pinterest users say they are "always shopping" in the app, social shopping holds a lot of value for businesses.

Examples: Facebook for Business, Shopify x TikTok, Instagram Shop and Pinterest Shoppable Pins

How brands can use social shopping networks :

- Create a Facebook shop and link it to your Facebook and Instagram pages
- Use Pinterest Shoppable Pins to tag products in your posts and allow users to purchase them without leaving the app
- Add a TikTok Shop to your profile and sell products directly to your fans
- Tag products in Instagram posts and Stories and link to your website or other platforms like Shopify

9. Interactive social media apps

Overview: These types of social media apps focus on user interaction and engagement. They encourage users to communicate, usually through gamification, competitions or voting.

For example, Snapchat's "Lenses" feature lets users add augmented-reality filters to their photos and videos. And, TikTok has "Duets" that allow users to record themselves singing or dancing alongside another user's video.

Examples: Instagram Stories, Snapchat, TikTok, Tumblr and Weibo

How brands can use interactive social media apps:

- Create a branded Snapchat Lens or Filter that your audience can play with
- Encourage users to Duet your TikTok video to win a prize
- Stay active in the comment section of Weibo Stories

10. Discussion forums

Overview: Discussion forums are online platforms where people can ask questions, give answers and start discussions on a variety of topics. For example, Reddit has communities (called subreddits) for just about every topic imaginable, from jokes to cryptocurrency.

Brands can visit forums to engage in social listening—learning what people are saying about them and getting feedback from customers and potential customers.

Examples: Reddit, Quora and Stack Overflow

How brands can use discussion forums:

- Crowdsource product feedback and ideas in relevant forum threads
- Provide customer support in forums where your people are discussing your brand
- Participate in relevant subreddits and answer questions related to your industry

11. Microblogging platforms

Overview: Microblogging is a type of social media marketing that allows users to post short updates or messages. Twitter is the most famous example of microblogging, allowing users to tweet in 140 characters or less.

While microblogging was once dominated by Twitter, platforms like LinkedIn and Tumblr have also become popular microblogging sites.

Examples: Twitter, Tumblr, Pinterest and LinkedIn

How brands can use microblogging platforms:

- Use hashtags to join conversations about your industry or product
- Share news, articles and other content relevant to your followers
- Offer customer support or answer questions in microblogs or comments

12. Community blogging sites

Overview: Community blogging sites are platforms where people can come together to write articles, share ideas and collaborate on projects. Most community blogging sites focus on a specific niche or topic, which makes them a great resource for finding new content ideas and connecting with other like-minded individuals. They also tend to have very engaged users, which can be beneficial for promoting your brand or product.

Examples: Medium, GrowthHackers, BlogEngage and DoSplash

How brands can use community blogging sites:

- Create or curate content around a specific topic
- Build relationships with other bloggers in your niche
- Generate traffic back to your own blog

13. Social review sites

Overview: According to Statista, 36% of consumers use online reviews to inform their purchase decisions. Many of them also trust online reviews as much as personal recommendations.

Curating, collecting and engaging with your online reviews is essential to success in many industries today. Plus, did you know you can post directly to your Google Business Profile using Sprout Social?

Examples: Google Business Profile, Amazon, Yelp and Facebook

How brands can use social review sites:

- Monitor and respond to reviews in a timely manner
- Encourage happy customers to leave positive reviews
- Use negative reviews as an opportunity to improve your business

14. Social curation and bookmarking sites

Overview: Social bookmarking lets you save web pages so you can revisit them later. These sites also allow users to add annotations, share bookmarks with others and discover new content.

Use this type of social media to curate content for your team or customers. It's also a great place to create a content bucket than you can repurpose across your social media channels.

UNIT-V

2 Marks

1. What is mean by Deep Learning

Deep learning is a branch of machine learning which is based on artificial neural networks. It is capable of learning complex patterns and relationships within data. In deep learning, we don't need to explicitly program everything. It has become increasingly popular in recent years due to the advances in processing power and the availability of large datasets. Because it is based on artificial neural networks (ANNs) also known as deep neural networks (DNNs). These neural networks are inspired by the structure and function of the human brain's biological neurons, and they are designed to learn from large amounts of data.

2. **List out the Advantages and Disadvantages of Deep Learning.**

1. Automatic Feature Learning

The algorithms employed in Deep learning are powered to automatically learn features eliminating the need for hand-engineered intervention. This is especially beneficial for tasks with difficult-to-define properties, such as picture recognition.

2. Handling huge and complicated datasets

Deep learning algorithms come with the potential of handling enormous and complex datasets that typical traditional machine learning algorithms would struggle to comprehend. This feature makes it a powerful tool that can be leveraged in gaining insights from the colossal amount of data and huge datasets. This is one of the most critical advantages of deep learning in comparison to other traditional methods.

Disadvantages of Deep Learning

1. Requires a Large Amount of Data

Deep Learning's advantage of using massive data as its training dataset can cause a big advantage. A significant amount of High-quality data is required for the proper functioning of a deep learning model. This massive requirement demands a significant amount of time as well as resources for obtaining data.

2. Extensive computing Needs

This is one of the major disadvantages of Deep learning. For training a specific model with huge datasets necessitates more computing resources than other machine learning models. Some of the examples are - Powerful central processors and graphics processing units, large amounts of storage and random-access memories, etc.

3.What Is Big Data?

Big data refers to the large, diverse sets of information that grow at ever-increasing rates. It encompasses the volume of information, the velocity or speed at which it is created and collected, and the variety or scope of the data points being covered (known as the "three v's" of big data). Big data often comes from data mining and arrives in multiple formats.

4. Pervasive Computing

Ubiquitous Computing also called Pervasive Computing is the consequence of such rapid advancement of computing that technology is omnipresent and prevalent. Such devices are always inter-connected and continuously available by leveraging the internet and wireless computing.

5. Pervasive Computing technology.

Pervasive computing, also called ubiquitous computing, is the growing trend of embedding computational capability (generally in the form of microprocessors) into everyday objects to make them effectively communicate and perform useful tasks in a way that minimizes the end user's need to interact with computers as computers. Pervasive computing devices are network-connected and constantly available.

6. Pervasive Computing infrastructure.

The aim of ubiquitous computing is to design computing infrastructures in such a manner that they integrate seamlessly with the environment and become almost invisible. The essence of that vision was the creation of environments saturated with computing and communication capability, yet gracefully integrated with human users.

7.Cloud computing

Cloud computing is on-demand access, via the internet, to computing resources—applications, servers (physical servers and virtual servers), data storage, development tools, networking capabilities, and more—hosted at a remote data center managed by a cloud services provider (or CSP).

8. Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

9.Internet of things

The term IoT, or Internet of Things, refers to the collective network of connected devices and the technology that facilitates communication between devices and the cloud, as well as between the devices themselves.

10. What are Smart Appliances?

Any appliance can become smart with wireless connectivity and sensors that allow remote control or autonomous operation through user input, scheduling, or artificial intelligence and machine learning (AI/ML).

11. A blockchain is "a distributed database that maintains a continuously growing list of ordered records, called blocks." These blocks "are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data.

12. A cryptocurrency is a digital currency, which is an alternative form of payment created using encryption algorithms. The use of encryption technologies means that cryptocurrencies function both as a currency and as a virtual accounting system. To use cryptocurrencies, you need a cryptocurrency wallet.

13 Quantum computing is a multidisciplinary field comprising aspects of computer science, physics, and mathematics that utilizes quantum mechanics to solve complex problems faster than on classical computers. The field of quantum computing includes hardware research and application development.

14.A blockchain is "a distributed database that maintains a continuously growing list of ordered records, called blocks." These blocks "are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data.

15 List out the advantage and disadvantage of IoT

Advantages:

- It can assist in the smarter control of homes and cities via mobile phones. It enhances security and offers personal protection.
- By automating activities, it saves us a lot of time.
- Information is easily accessible, even if we are far away from our actual location, and it is updated frequently in real time.

Disadvantages:

- Hackers may gain access to the system and steal personal information. Since we add so many devices to the internet, there is a risk that our information as it can be misused.
- They rely heavily on the internet and are unable to function effectively without it.
- With the complexity of systems, there are many ways for them to fail.
- We lose control of our lives—our lives will be fully controlled and reliant on technology.

16. Difference between Machine Learning and Deep Learning:

Machine Learning	**Deep Learning**
Apply statistical algorithms to learn the hidden patterns and relationships in the dataset.	Uses artificial neural network architecture to learn the hidden patterns and relationships in the dataset.
Can work on the smaller amount of dataset	Requires the larger volume of dataset compared

Machine Learning	Deep Learning
	to machine learning
Better for the low-label task.	Better for complex task like image processing, natural language processing, etc.
Takes less time to train the model.	Takes more time to train the model.
A model is created by relevant features which are manually extracted from images to detect an object in the image.	Relevant features are automatically extracted from images. It is an end-to-end learning process.
Less complex and easy to interpret the result.	More complex, it works like the black box interpretations of the result are not easy.
It can work on the CPU or requires less computing power as compared to deep learning.	It requires a high-performance computer with GPU.

17. Define E-business

Electronic business, commonly referred to as "**eBusiness**" or "**e-business**", may be defined as the application of information and communication technologies (ICT) in support of all the activities of business.

18. What are the classifications of E-Bussiness?

Roughly dividing the world into providers/producers and consumers/clients one can classify E-businesses into the following categories:

- business-to-business (B2B)
- business-to-consumer (B2C)
- business-to-employee (B2E)
- Business-to-government (B2G)
- government-to-business (G2B)
- government-to-government (G2G)
- government-to-citizen (G2C)
- consumer-to-consumer (C2C)
- consumer-to-business (C2B)

19. List out some of the E-Business models.

The following is a list of the currently most adopted e-business models such as:

E-shops

E-commerce

E-

procurement

E-malls

E-auctions

Collaboration Platforms

Third-party Marketplaces

[134]

a. Value-chain Integrators
b. Value-chain Service Providers
c. Information Brokerage
d. Telecommunication

20. What is mean by E-Governance?

E-Governance is the application of Information and Communication Technology (ICT) for delivering government services, exchange of information communication transactions, integration various stand-one systems and services between Government-to-Citizens (G2C), Government-to- Business(G2B),Government-to-Government(G2G) as well as back office processes and interactions within the entire government frame work.

21. Name the three main target groups in the concept of Governance.

The three main target groups that can be distinguished in governance concepts are Government, citizens and businesses/interest groups.

22. What is Pervasive Computing?

Ubiquitous computing (**ubicomp**) is a post-desktop model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities. In the course of ordinary activities, someone "using" ubiquitous computing engages many computational devices and systems simultaneously, and may not necessarily even be aware that they are doing so. This model is usually considered advancement from the desktop paradigm.

23. Define Supply Chain Management.

Supply chain management can be defined as the way a company finds the raw components it needs to make products or services, produces those products or services, and delivers them to customers.

24. List out the five basic steps in Supply Chain Management.

The following are the five basic steps in Supply Chain Management

- Plan
- Source

- Make
- Deliver
- Return

25.Define ERP.

Enterprise Resource Planning is a process by which a company (often a manufacturer) manages and integrates the important parts of its business. An ERP management information system integrates areas such as planning, purchasing, inventory, sales, marketing, finance, human resources, etc.

13 MARKS

1.What are the types of Internet Security? Explain it.

Network security allows you to take preventive measures to help protect the networking infrastructure from malfunction, misuse, destruction, modification, unauthorized access, etc. While you are uploading your data on the internet and thinking it is safe and secure, attackers can breach this data and leak confidential information or steal money. This is why it is necessary to secure your network.

Network security, is an important part of cyber security and, helps in protecting your network and data stored in it from breaches, software and hardware intrusion, and more. Network security defines a set of important rules, regulations, and configurations based on threats, network use, accessibility, and complete threat security.

Types of Network Security Protections

In the field of network security, there are multiple components working together to ensure the security of data and networks. Based on this, there are several different types of network security:

- Firewalls
- Access control
- Virtual private networks (VPNs)
- Intrusion prevention systems
- Wireless security
- Application security
- Behavioral analytics

Firewalls

Firewalls are services or devices that act as guards responsible for deciding which web page, pop up, and other services enter and exit a network. These firewalls use a predefined set of rules that assist in blocking or allowing traffic, depending on the requirements. Firewalls can be for software, hardware, or both, depending on the needs of the system.

Access Control

Access control allows companies to prevent potential attackers from invading confidential information and to block unauthorized devices and users from accessing the given network. This allows only those users to access the network who are permitted to work with the given resources.

Virtual Private Networks (VPNs)

A VPN generally uses the internet to encrypt the connection between an endpoint device and a network. Further, VPN allows professionals to authenticate the communication between the network and the device. This results in building an encrypted and secure tunnel via the internet.

Intrusion Prevention Systems

Intrusion prevention systems find and prevent attacks by scanning network traffic. This is done by using databases of attack techniques that professionals are familiar with and correlating them with network activities.

Wireless Security

Wired networks are not as secure as wireless networks. It is necessary for you to control the devices and users that can access your company's network. Hence, it is important for you to have wireless security, especially when cybercriminals are rapidly targeting confidential information for extortion.

Application Security

Application security involves a set of software, hardware, and processes that track and lock the weak points of an application to be easily be targeted by attackers to infiltrate your network.

Behavioral Analytics

If you want to be able to identify anomalies and various network breaches as and when they occur, you need to have a clear idea of the normal behavior of your network. There are varied behavioral analytics tools available that automatically spot abnormal activities.

Further in this blog, you will read about the several tools that can be used by network security experts to protect networks.

2.Explain the Top Network Security Tools

Some of the security tools, hardware, and software that are necessary to ensure that the network is, indeed, secure are listed below:

- Wireshark
- Nessus
- Snort
- Netcat
- Metasploit

- Aircrack
- BackTrack
- Cain and Abel

After gaining insights into the tools that are used to secure networks, let us now understand what is a network security attack and how it can corrupt the security of any network.

Network Security Attack

Network security attack is malicious attempts that are carried out by cybercriminals to compromise the security of a network. These attacks are the reasons why there is a great need for network security. Network security is responsible for preventing these attacks on the network infrastructure. Let us learn more about such attacks that can help you identify the methods to prevent them.

Types of Attacks in Network Security

Some of the different types of network security attacks are mentioned below:

Virus

It is a malicious file that is downloadable, and once opened by a user, it starts to replace the codes in the computer with its own set of codes. On spreading, the system files in the computer will be corrupted, which can result in the corruption of the files of other computer systems in the network.

Malware

It is among the severe-most and fastest types of malicious attacks that help gain unauthorized access to a system or network of systems. Malware is generally self-replicating, i.e., once a system is corrupted, malware gains entry through the internet and easily corrupts all computer systems that are connected to the network via the internet. In the case of malware, even an external device connected to the system will get corrupted.

Worm

It enters a given system without the need of a user. If a user is running an application that is not too strong, any attacker or hacker using the same internet connection can easily send malware to that app. Without the knowledge of the user, the application could accept and execute this malware over the internet, leading to the creation of a worm. Ethical hackers are in high demand to prevent this type of network security attack.

Packet sniffer

If a user places a passive receiver in the region of a wireless transmitter, then it ends up seeing a copy of the transmitted packets. Often, these packets consist of confidential organization data, trade secrets, etc., which can get through to the packet receiver. The packet receiver becomes a packet sniffer and it goes through all the packets transmitted in the range. Cryptography is the best way to prevent this form of network security attack.

Phishing

This is one of the most common forms of attacks on network security. In this, attackers send emails to users pretending to be from a known source, such as investors and bankers, and building a sense of urgency to catch the users' attention and/or excite them. These emails have probable chances of containing malicious attachments or links, which ask users to share confidential data.

Compromised key

When an attacker gets a network security key, it is known as a compromised key that acts as a tool to extract sensitive data. In this case, the attacker uses a compromised key and gets unauthorized access to secure data. This key comprises of a code or number that assists in interpreting secure data without any notification to the sender or receiver.

Botnet

It is a malicious software that attacks a set of computers connected through a private network. The attacker gains access and controls all the systems on that network without the knowledge of the

owner. All the computers on that network are referred to as zombies that spread and corrupt a large number of devices as per the instructions of the attacker.

DoS

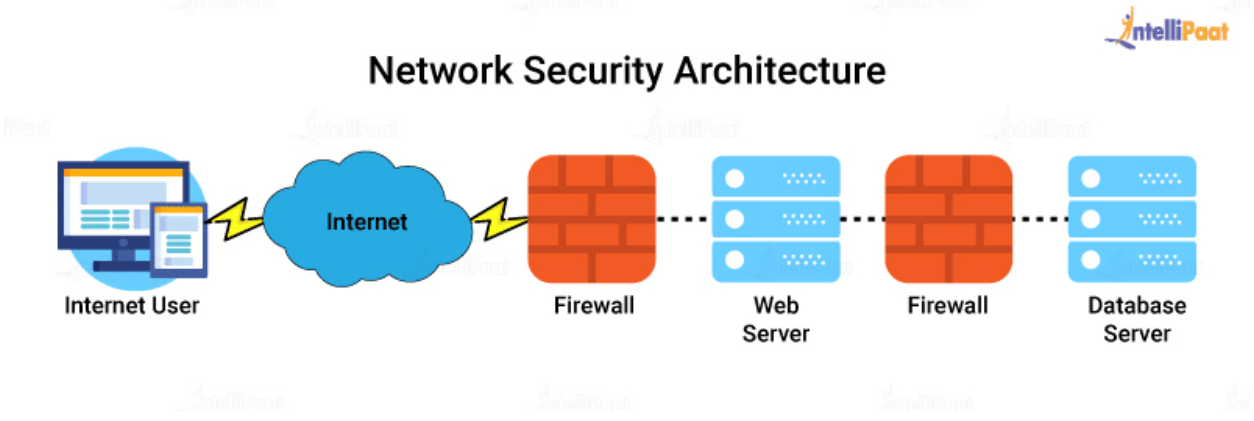
DoS is known as denial of service. This attack is capable of destroying the users' networks partially or completely. DoS can also attack even a complete IT infrastructure, making it unavailable to the actual users. DoS attacks can generally be classified into three categories, namely, connection flooding, vulnerability attacks, and bandwidth flooding.

Let us now briefly discuss the security architecture of a network.

Network Security Architecture

The architecture of network security models is the result of a well-thought systematic process. While building the architecture, professionals need to keep in mind the type of security the organization requires. Further, they must design several processes, systems, and tools that will help them prevent all sorts of network attacks. The architecture may comprise elements such as access control lists, firewalls, and other types of network security.

An example of a network security diagram is given below:



Now, you will come across some of the numerous job opportunities available for professionals who have the skills to secure a network.

3.Explain about the Concept of Wireless Network Security.

Introduction

Wireless networks infrastructure is very widespread in the individuals' and organizational usage. Today many laptops are designed to include the pre-installed wireless cards, thus this technology becomes more and more popular. As well the ability to enter a network through mobile connection has had great advantages for the customers. But notwithstanding the easiness of utilizations the wireless networks meet with various and risk since they can be easily broken into and wireless technology may be utilized to crack the wired networks. This paper, therefore deals with the crucial issue of wireless networks security. First we will discuss the main risks connected with utilization of wireless networks and then outline major instruments to ensure their security.

Security risks

When wireless technology was first introduced there existed not much risks and dangers for their security. But as they become more widespread at the corporate level the risks had covered wireless protocols and encryption standards and methodic. The intrusion and cracking to wireless networks also became easier with the dissemination of Windows- and Linux-based plug-ins and tools which are available on the Internet.

Another problem is that some companies and organizations do not have concern in wireless security due to the fact that they do not use wireless network. But as META Group () estimated, 95% of all laptop computers purchased in 2005 are equipped with wireless, thus security problems may occur due to their connection to common corporate network.

Categories of unauthorized access to wireless computer networks.

There are several categories of unauthorized access to such networks:

- Accidental association – occurs when computer for some reason uses wireless network access point from another company or organization that is using wireless technologies.
- Malicious association – connection to the organization's wireless network through the cracking laptop. The technology of such a cracking is designed to make the wireless card look like some company's access point. Wireless networks operating at the Layer 1-3 have such protections as authentication of network, but unfortunately virtual private networks (VPN) do not have such barriers. Wireless networks 802.1×authentications have considerable level of security but still are very vulnerable to cracking (Sandler, 2005).
- Ad-hoc networks – do not have access-point between them and thus have not very good protection.
- Networks of non-traditional nature – Bluetooth and other personal networks can also be regarded as potential object of cracking due to the low level of security protection. The

security protection is needed even for wireless printers and barcode readers. But this is not so difficult to provide as for the latter types of networks.

- Identity theft – happens when a cracker has a possibility to identify MAC address and obtain server network computer privileges.

Among other types of security risks one should mention attacks called ‘man in the middle’, which are realized through ‘de-authentication attack’ which forces wireless network computer to reconnect to cracking laptop access point; A Denial-of-Service attack (DoS), which happens when an attacker continuously bombards network access point with various false requests, connection messages and other commands. Thus, authorized users do not have access to the network which can result in its complete collapse. These intrusions rely on the abuse of such protocols as EAP – Extensible Authentication Protocol.

Security measures

The main measures to secure organized wireless networks have several steps: 1. wireless LAN instruments and devices should be properly secured; 2. all users must be properly prepared; 3. the wireless networks should be properly monitored for breaches.

Among the concrete measures of providing wireless network security one should mention MAC filtering which provides administrator with possibility to give access only to those computers that have certain MAC IDs. Another tool is Static IP addressing which allows ensuring that undefined and unused IP addresses would not log in the wireless networks. Besides such tools there exist special language of wireless networks’ encryption called WEP encryption (Hoover, 2005, July). While it can prove useful in some cases there many deficiencies and breaches that can be circumvented by crackers using open source cracker’s software. The drawback of this encryption mechanism were later corrected in WPA (Wi-FI Protected Access), which uses TKIP encryption algorithm and WPA 2 the main advantage of which is the introduction of the AES-CCMP algorithms as a necessary feature, which ensured creation comprehensive wireless networks security mechanism.

Besides this, different security protocols are used for the wireless networks LEAP, PEAP and TKIP which are designed to provide the secure transport of data, encryption keys and various passwords.

Some mechanism such as USB tokens, software tokens and smart cards are used for high security networks, which require highly sophisticated and strict procedures for authorization and authentication.

4.