

Times asked:

6 times

5 times

4 times

3 times

2 times

1 time

Module 1 – Introduction to Information Systems	Marks
1. How does IT impact organizations?	5
2. Define Information Security with an example.	5
3. Explain the impact of information system on organization and society.	10
4. Explain the impact of Information Systems to society.	5
5. What are the various components of Computer-Based Information System (CBIS)?	5
6. Explain in detail computer-based information systems.	10
7. What are the types of IS?	10
8. Highlight the economic impacts of IS with examples.	10
9. Compare and contrast basic types of reports associated with FAIS and ERP systems.	10
10. Evaluate the MIS Hierarchy to comment on Decision Support System.	5
11. Contrast to bring out advantages & disadvantages of Competitive environment in organization.	10
12. What is Decision Support System (DSS)? Explain application of DSS.	10
Module 2 – Data & Knowledge Management, Business Intelligence	
1. Explain DataWarehouse & DataMart. Give two examples which show generation of Big Data.	10
2. What is Big Data? Explain its characteristics and challenges.	10
3. Analyze the impact of Business Intelligence (BI) on decision making.	10/5
4. Explain the steps involved in knowledge capturing.	10
5. Illustrate Knowledge Management life cycle.	10

6. Explain the challenges faced by Knowledge Management in different business scenarios. 5
7. Explain different types of knowledge and the four modes of knowledge conversion. 10
8. How is the quality of data ensured in an organization? 10
9. Explain Data Warehouse in an organization. 10
10. Compare and contrast Web 1.0, Web 2.0, and Web 3.0. 10
11. Create an MIS system for any hospital. 10
12. What are the different types of MIS? 5
13. Analyse briefly to highlight the difference between Web 2.0 and Web 3.0? 10
14. How is data governance achieved in case of MIS? 5
15. Highlight how a company can use Big Data to gain competitive advantage. 10

➤ Module 3 – Ethical Issues & Privacy

1. Identify measures to improve cybersecurity with examples. 10
2. Analyze the main reasons for computer crimes. 10
3. What are major security threats to Information Security & measures for controlling them? 10
4. Evaluate the role of Confidentiality, Integrity, and Availability (CIA) in achieving security. 10
5. Discuss how privacy issue can impact transborder data flows? 10
6. Is security an ethical responsibility? Justify with a case study. 10
7. Explain the five factors contributing to the increasing vulnerability of information resources with examples. 5
8. Describe the privacy issues affected by IT. 10
9. Give an understanding of types of control to achieve security. 10

➤ Module 4 – Social Computing

1. Explain CRM & describe types of CRM with examples & relate role of SC on CRM. 10
2. Analyze how social computing is inspiring customer service? 5
3. Write notes on E-commerce. 10
4. Compare between mobile applications like WhatsApp and Telegram on various 5

Parameters like multimedia, security, privacy, storage, data usage, notifications etc.

5. Write note on M-commerce. What are new challenges that it has introduced in business. 10
6. How is E-commerce supported by MIS? Give one case to describe same. 5
7. Write notes on E-Business. 10
8. Give examples of B2B and B2C business models and explain how MIS controls them. 10
9. Describe the benefits of Social Commerce to customers. 10
10. What is the need of Social Computing for businesses? 10
11. Briefly describe the risks of social computing to business giving suitable examples. 10
12. Are Blogs and Wikis different? Justify with application of each. 5
13. Develop the plan for delivery application in M-commerce using social computing. 10

❖ Module 5 – Computer Networks & Cloud Computing

1. Describe various Cloud Computing models and highlight their evolution. 10
2. Analyze the key benefits of cloud computing 10
3. Define topology and its types with advantages and disadvantages. 5
4. List the main differences between wireless and wired technologies. 5
5. Explain applications of computer networks. 5
6. What do you mean by CAAS, SAAS, and TAAS? Give the application of each. 5

❖ Module 6 – Information Systems within Organizations & SDLC (8 Hrs)

1. Describe the tools that augment the traditional SDLC. 5
2. List down the types of support provided by Accounting IS, Finance IS, Production/ Operations Management (POM) IS, Marketing IS, and Human Resources IS. 10
3. Categorize the approach to managing information across an entire organization. 5
4. What are the features of Executive Support System (ESS)? 5
5. Explain the phases of the System Development Life Cycle with examples. 10
6. Write short notes on (1) TPS (2) ERP 10
7. Identify advantages and drawbacks of businesses implementing an ERP system. 10
8. Explain what do you mean by Office Automation System. 10
9. Give an overview of System Development. 5

Chapter 1: Introduction to Information Systems

1. How does IT impact organizations? (5 Marks)

Information Technology (IT) fundamentally impacts organizations by transforming their operations, strategies, and competitive landscape. It enhances efficiency, enables new business models, and improves decision-making processes.

Key Impacts of IT on Organizations:

1. Operational Efficiency:

- IT automates routine and manual tasks, such as data entry, payroll processing, and inventory management, leading to faster processes, reduced errors, and lower operational costs.
- Tools like Enterprise Resource Planning (ERP) systems integrate various departments (e.g., finance, HR, supply chain), streamlining workflows and improving coordination.

2. Improved Decision-Making:

- IT systems provide managers with timely and accurate data through reporting tools, dashboards, and Business Intelligence (BI) applications.
- This data-driven approach allows for better analysis of trends, performance, and market conditions, leading to more informed and strategic decisions.

3. Customer Relationship Management (CRM):

- IT enables organizations to manage and analyze customer interactions and data throughout the customer lifecycle.
- CRM systems help in improving customer service, personalizing marketing efforts, and increasing customer retention and sales.

4. Enablement of New Business Models:

- IT is the backbone of modern business models like e-commerce (Amazon), streaming services (Netflix), and the sharing economy (Uber, Airbnb).
- It allows businesses to reach a global market, operate 24/7, and create digital products and services.

5. Organizational Structure and Communication:

- IT flattens organizational hierarchies by enabling direct communication across different levels and departments through email, instant messaging, and collaborative platforms (e.g., Slack, Microsoft Teams).
- It facilitates remote work and virtual teams, making the organization more flexible and agile.

2. Define Information Security with an example. (5 Marks)

Information Security refers to the practice of protecting digital information from unauthorized access, use, disclosure, disruption, modification, or destruction. Its primary goal is to ensure the confidentiality, integrity, and availability of data, often called the "CIA Triad."

- **Confidentiality:** Ensuring that information is accessible only to those authorized to have access.
- **Integrity:** Safeguarding the accuracy and completeness of information and processing methods.
- **Availability:** Ensuring that authorized users have access to information and associated assets when required.

Example: Online Banking When you use online banking, information security measures are in place to protect your data:

- **Confidentiality:** Your login credentials (username and password) and account details are encrypted during transmission to prevent hackers from reading them. Multi-factor authentication adds an extra layer of security.
- **Integrity:** The bank uses controls to ensure that a transaction you initiate for \$100 cannot be altered to \$1000 during processing. Hashing and digital signatures are used to verify that data has not been tampered with.
- **Availability:** The bank's servers are protected against Denial-of-Service (DoS) attacks and have backup systems to ensure that you can access your account whenever you need to.



3. Explain the impact of information system on organization and society. (10 Marks)

Information Systems (IS) have a profound and dual impact, transforming both the internal workings of organizations and the broader fabric of society.

Impact on Organizations:

1. Flattening of Organizations:

- IS reduces the need for middle management by enabling senior management to access operational data directly and communicate with lower levels efficiently. This leads to flatter, more decentralized organizational structures.

2. Increased Flexibility and Agility:

- Organizations can respond more quickly to market changes and customer demands. IS enables virtual teams, remote work, and rapid reconfiguration of business processes.

3. Strategic Competitive Advantage:

- IS can be used to create new products and services, differentiate from competitors, and build stronger relationships with customers and suppliers (e.g., Amazon's recommendation system, Uber's ride-hailing platform).

4. Business Process Re-engineering:

- IS often necessitates and enables the radical redesign of core business processes to achieve dramatic improvements in productivity and efficiency. For example, the implementation of an ERP system forces a company to standardize and integrate its processes across departments.

Impact on Society:

1. The Digital Divide:

- While IS provides immense opportunities, it has also created a gap between those who have easy access to digital technology and the internet and those who do not. This divide can exacerbate existing social and economic inequalities.

2. Changes in Employment and the Nature of Work:

- IS has automated many routine, manual jobs, leading to job displacement in some sectors. Simultaneously, it has created new job opportunities in fields like software development, data analysis, and digital marketing. It has also enabled the gig economy and remote work.

3. Increased Accountability and Transparency:

- Social media and online platforms have increased the power of individuals and communities to hold organizations and governments accountable. Information leaks and digital footprints make it harder to hide misconduct.

4. Social Connectivity and Relationships:

- IS, especially social media, has revolutionized how people connect and maintain relationships. It allows for instant communication across the globe but has also raised concerns about the quality of online interactions, cyberbullying, and the erosion of face-to-face social skills.

5. Dependence on Technology and Security Risks:

- Society has become heavily dependent on IS for critical functions like banking, healthcare, and utilities. This dependence makes society vulnerable to system failures, cyberattacks.

4. Explain the impact of Information Systems to society. (5 Marks)

Information Systems (IS) have fundamentally reshaped society, creating both significant benefits and new challenges that affect daily life.

Key Societal Impacts:

1. **The Digital Divide:** IS has created a social split between individuals and communities that have access to modern information technology and the internet and those who do not. This gap can limit educational, economic, and social opportunities for disadvantaged groups.
2. **Changes in Employment:** IS has automated many routine jobs, leading to shifts in the job market. While it eliminates some roles, it creates new ones in tech sectors and enables flexible work arrangements like remote work and the gig economy (e.g., freelancers, Uber drivers).
3. **Social Connectivity and Media:** Social media platforms (e.g., Facebook, Twitter) have transformed communication, enabling instant global connectivity. However, this has also led to issues like the spread of misinformation, online echo chambers, and concerns about privacy and mental health.
4. **Increased Transparency and Accountability:** IS empowers citizens by providing access to information and a platform to voice opinions. It has increased scrutiny of corporations and governments, leading to greater demands for transparency and ethical behavior.
5. **Dependence and Vulnerability:** Society's critical infrastructure (power grids, financial systems, healthcare) now relies heavily on IS. This creates vulnerability to cyberattacks, data breaches, and system failures, posing significant risks to national security and public safety.

5. What are the various components of Computer-Based Information System (CBIS)? (5 Marks)

A Computer-Based Information System (CBIS) is an information system that uses computer hardware and software to process, store, and analyze data. It is composed of five fundamental components that work together to achieve a common goal.

Components of a CBIS:

1. **Hardware:** The physical, tangible technology that makes up the computer system. This includes processors, keyboards, monitors, servers, and networking equipment. Hardware provides the platform upon which the software operates and data is stored.
2. **Software:** The set of instructions that tell the hardware what to do. It is divided into:
 - **System Software:** The operating system (e.g., Windows, Linux) that manages the hardware and provides a platform for application software.
 - **Application Software:** Programs designed for end-users to perform specific tasks (e.g., Microsoft Word, an ERP system, a web browser).
3. **Data:** Raw facts and figures that are processed by the system to generate meaningful information. Data is the fundamental resource input for any CBIS (e.g., sales figures, customer names, inventory counts).
4. **Procedures:** The strategies, policies, methods, and rules for using the CBIS. Procedures guide people on how to operate the hardware and software, how to enter data, and what to do with the output. They are the bridge between the technical system and its human users.
5. **People:** The most important component. This includes all the individuals who use, manage, maintain, and design the system, such as end-users, system analysts, programmers, and IT managers. People are essential for inputting data, interpreting information, and making decisions based on the system's output.

6. Explain in detail computer-based information systems. (10 Marks)



A Computer-Based Information System (CBIS) is an integrated set of components for collecting, storing, processing, and disseminating information, with the core of its operations centered on computer technology. The primary purpose of a CBIS is to take data as input, process it, and produce meaningful information as output to support operations, management, and decision-making in an organization.

Detailed Components of a CBIS:

1. **Hardware:** This refers to the physical equipment used for input, processing, output, and networking activities.
 - **Input Devices:** Keyboard, mouse, scanner, barcode reader, sensors.
 - **Processing Devices:** Central Processing Unit (CPU) and memory (RAM) where actual data computation occurs.
 - **Output Devices:** Monitors, printers, speakers that present the processed information to the user.
 - **Storage Devices:** Hard disks, solid-state drives, and cloud storage that hold data and software permanently.
 - **Networking Devices:** Routers, switches, and modems that facilitate communication between computers.
2. **Software:** These are the programs that control and coordinate the hardware components and instruct them on what to do.
 - **System Software:** The operating system (e.g., Windows, macOS, Linux) is the most crucial type. It manages hardware resources, provides a user interface, and runs application software.
 - **Application Software:** These are programs designed for end-users to perform specific tasks. Examples include word processors, spreadsheets, enterprise systems like SAP, and custom-built business applications.
3. **Data:** Data are the raw facts and figures that are unorganized and unprocessed. In a CBIS, data is the primary input that is transformed into useful information.
 - Data is typically stored in databases or data warehouses, which are structured collections of data managed by Database Management Systems (DBMS).
 - For example, individual sales transactions (date, item, price) are data.
4. **Procedures:** Procedures are the rules, guidelines, and strategies that govern the operation and use of the CBIS.
 - They include instructions for users on how to operate software, how to log in securely, how to back up data, and how to respond to system errors.
 - Well-defined procedures ensure that the system is used consistently and effectively to achieve organizational goals.
5. **People:** People are the most critical element of a CBIS. They are involved in every aspect of the system's lifecycle.
 - **End Users:** Also known as clients, they are the people who use the CBIS to perform their jobs, such as accountants, managers, and data entry clerks.
 - **IT Specialists:** These include systems analysts, programmers, network administrators, and IT managers who design, develop, implement, and maintain the system.

The Process Flow: The components work together in a cycle: **People** follow **procedures** to use **hardware** and **software** to input **data**. The software processes this data on the hardware, and the resulting **information** is outputted to the people, who then use it to make decisions.

7. What are the types of IS? (10 Marks)

Information Systems (IS) can be classified into different types based on the organizational level they support and the function they perform. Each type is designed to meet the specific needs of a particular group of users within an organization.

Major Types of Information Systems:

1. Transaction Processing System (TPS)

- **Purpose:** To process and record the daily routine transactions necessary to conduct business. It is the most fundamental operational-level system.
- **Users:** Operational staff and supervisors.
- **Examples:**
 - A **point-of-sale (POS) system** in a retail store that records sales.
 - A **payroll system** that processes employee timecards and produces paychecks.
 - An **online booking system** for an airline.

2. Management Information System (MIS)

- **Purpose:** To serve middle managers by providing reports and summaries of an organization's basic operations. It takes data from TPS, summarizes it, and produces routine reports.
- **Users:** Middle managers.
- **Examples:**
 - A **monthly sales report** summarizing sales by product and region.
 - An **annual budget report** comparing actual expenses to budgeted expenses.
 - An **inventory summary report** showing current stock levels.

3. Decision Support System (DSS)

- **Purpose:** To support non-routine decision-making for middle and senior managers. It focuses on unique and changing problems that require human judgment.
- **Users:** Middle and senior managers, analysts.
- **Examples:**
 - A **"what-if" analysis model** to forecast revenue if sales increase by 10%.
 - A **supply chain optimization system** that helps managers decide the most cost-effective shipping routes.
 - A **financial modeling system** for evaluating investment opportunities.

4. Executive Support System (ESS) / Executive Information System (EIS)

- **Purpose:** To help senior management make strategic decisions. It provides a generalized computing and communication environment focused on unstructured

decisions.

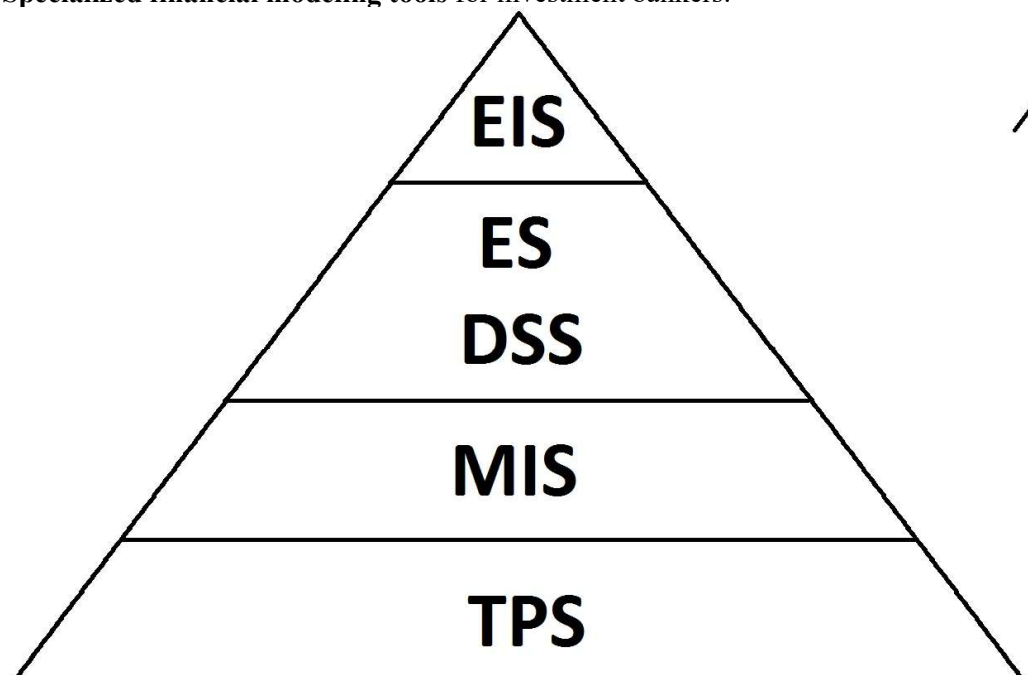
- **Users:** Senior executives.
- **Examples:**
 - A **digital dashboard** that displays key performance indicators (KPIs) for the entire company, such as market share, profitability, and competitor activity.
 - A system for analyzing **long-term industry trends** and forecasting.

5. Office Automation System (OAS)

- **Purpose:** To support data workers by increasing the productivity of individuals and groups in handling information and communication.
- **Users:** Data workers (e.g., secretaries, clerks).
- **Examples:**
 - **Word processing software** (Microsoft Word).
 - **Email and calendar systems** (Microsoft Outlook).
 - **Collaborative software** (Google Workspace, Microsoft Teams).

6. Knowledge Work System (KWS)

- **Purpose:** To support knowledge workers (professionals like engineers, scientists, doctors) in creating and integrating new knowledge into the organization.
- **Users:** Knowledge workers.
- **Examples:**
 - **Computer-Aided Design (CAD) systems** for engineers.
 - **Virtual reality systems** for architects.
 - **Specialized financial modeling tools** for investment bankers.



8. Highlight the economic impacts of IS with examples. (10 Marks)

Information Systems (IS) have profound economic impacts on organizations, markets, and the overall economy. They drive efficiency, create new business models, and shift cost structures, while also introducing new competitive dynamics.

Key Economic Impacts of Information Systems:

1. Reduction in Transaction and Agency Costs:

- **Impact:** IS dramatically lowers the cost of participating in markets (transaction costs) and the cost of managing employees and resources (agency costs)
- **Example:** Online banking and financial trading platforms allow customers and firms to execute transactions instantly and at a fraction of the cost of using a physical bank or broker. Internally, ERP systems reduce agency costs by improving management's ability to monitor and coordinate activities across the organization.

2. Creation of New Business Models and Markets:

- **Impact:** IS enables entirely new ways of doing business, often disrupting traditional industries.
- **Example:**
 - The "**sharing economy**" model of Uber and Airbnb creates markets for underutilized assets (cars, rooms) without the company owning the assets itself.
 - **E-commerce platforms** like Amazon and Alibaba have created massive global online marketplaces, reducing the need for physical storefronts.

3. Mass Customization and Personalization:

- **Impact:** IS allows firms to tailor their products, services, and marketing to individual customers at a mass scale, creating economic value.
- **Example:** Nike allows customers to design their own sneakers online. Netflix and Spotify use recommendation algorithms to personalize content for each user, increasing customer satisfaction and retention.

4. Shift in Strategic Focus from Cost to Differentiation:

- **Impact:** While IS helps reduce costs, its greater economic impact is often in enabling product and service differentiation.
- **Example:** Apple differentiates its products not just through hardware but through its integrated ecosystem of software and services (iOS, App Store, iCloud). This creates a loyal customer base and allows for premium pricing.

5. Information Asymmetry Reduction:

- **Impact:** IS makes information more accessible to all market participants, reducing the imbalance of information between buyers and sellers.
- **Example:** Price comparison websites (e.g., Google Shopping, Trivago) allow consumers to easily compare prices from multiple sellers, forcing businesses to compete more directly on price and service. Online reviews on platforms like Yelp and Amazon give buyers more power by providing insights from other consumers.

6. Globalization and 24/7 Economy:

- **Impact:** IS is a key driver of globalization, allowing businesses to operate and compete internationally with lower barriers to entry.
- **Example:** A small software developer can sell its application globally through digital storefronts like the Apple App Store or Google Play. Customer service can be outsourced to other countries and provided 24/7 via online chat and email.

9. Compare and contrast basic types of reports associated with FAIS and ERP systems.

(10 Marks)

1. Introduction

Functional Area Information Systems (FAIS) and Enterprise Resource Planning (ERP) systems are widely used in organizations to support information processing and managerial decision-making. Although both systems generate reports, the nature, scope, and purpose of these reports differ significantly. FAIS reports are focused on individual business functions, while ERP reports are integrated and enterprise-wide. This answer explains the types of FAIS and ERP reports and contrasts them clearly.

2. Reports in FAIS

FAIS support activities of specific departments such as Finance, Human Resources, Marketing, Production, and Accounting. Each department maintains its own system and database, so the reports are **functional, isolated, and department-specific**.

Table: Types of Reports in FAIS

Type of Report	Description	Example
Routine Reports	Produced regularly at fixed intervals	Daily sales or production report
Ad-hoc Reports	Generated on demand when needed	HR report on employees who worked overtime
Exception Reports	Triggered when performance deviates from set limits	Alert when stock falls below reorder level
Drill-Down Reports	Moves from summarized data to detailed departmental data	Region sales → city → salesperson
Key Indicator Reports	Shows critical departmental metrics	Finance liquidity ratio, HR turnover rate

FAIS reports mainly support **operational and tactical** decisions for individual departments.

3. Reports in ERP Systems

ERP systems integrate all business functions through a unified database. As a result, ERP reports are **cross-functional, real-time, and consistent**, supporting organization-wide decision-making.

Table: Types of Reports in ERP

Type of Report	Description	Example
Cross-Functional Reports	Combine data from multiple modules	Production cost = HR (labor) + Finance (cost) + Inventory
Dashboard & KPI Reports	Real-time visual monitoring of organizational performance	CEO dashboard: revenue, orders, cash flow
Drill-Across Reports	Move across modules horizontally	Sales order → inventory → procurement
Exception/Alert Reports	Automated warnings across departments	Alert for low raw materials affecting production and sales
Analytical/MIS Reports	Used for forecasting, trends, and strategic analysis	Sales forecast for next quarter

ERP reports support **operational, tactical, and strategic** levels due to their integrated nature.

4. Contrast Between FAIS and ERP Reports

Table: FAIS vs ERP – Contrast

Point of Difference	FAIS Reports	ERP Reports
Scope of Reporting	Department-specific	Organization-wide, cross-functional
Database Structure	Separate databases	Single unified database
Integration Level	Low; systems operate in silos	High; fully integrated modules
Report Types	Routine, Ad-hoc, Exception, Drill-Down	Cross-functional, Dashboard, Drill-Across, Analytics
Information Flow	Vertical (within one function)	Horizontal (across all functions)
Real-time Capability	Limited real-time information	High real-time accuracy
Decision Support	Operational & departmental decisions	Operational + Tactical + Strategic decisions
Data Consistency	May have redundancy or inconsistency	Highly accurate and consistent
User Level	Functional managers	All levels including top management
Analytical Ability	Limited analytical tools	Strong analytics, BI, and forecasting

5. Conclusion

FAIS reports assist individual departments in routine operations and short-term decision-making. However, they remain limited due to separate databases and lack of integration. ERP reports overcome these limitations by providing integrated, real-time, enterprise-wide information that supports better coordination, planning, and strategic decision-making. Therefore, ERP reporting is significantly more powerful, consistent, and comprehensive compared to FAIS.

10. Evaluate the MIS Hierarchy to comment on Decision Support System. (5 Marks)



The MIS Hierarchy, often visualized as a pyramid, classifies information systems based on the organizational level they support: Operational, Managerial, and Strategic. At the operational level, Transaction Processing Systems (TPS) handle routine data. At the managerial level, Management Information Systems (MIS) provide structured reports for tactical control.

The Decision Support System (DSS) resides at this managerial level but serves a distinct and more advanced purpose than a traditional MIS.

Comment on DSS within the MIS Hierarchy:

- **Evolution from MIS:** While a standard MIS provides pre-defined, summary reports to inform managers about what *has* happened, a DSS is designed to help managers decide what *should* happen. It is the logical evolution for dealing with semi-structured and unstructured problems that MIS cannot solve.
- **Focus on "What-If" Analysis:** DSS is interactive and analytical. Instead of just presenting historical data, it allows managers to model different scenarios, ask "what-if" questions, and compare potential outcomes. For example, a DSS can simulate the financial impact of a price change or a new market entry.
- **Support, Not Replacement:** A key principle of the hierarchy is that higher-level systems support, not replace, human judgment. A DSS does not automate decision-making; it provides sophisticated tools and models that empower managers to make more informed, effective decisions.
- **Bridging to Strategic Level:** While primarily a managerial-level system, a sophisticated DSS can also provide crucial support to the strategic level (Executive Support Systems) by analyzing complex, long-term trends and strategic options.

In essence, the DSS fills a critical gap in the MIS hierarchy by providing the analytical firepower needed for the complex, non-routine decisions that characterize modern management.

11. Contrast to bring out advantages & disadvantages of Competitive environment in organization. (10 Marks)

A competitive environment refers to the dynamic external system in which businesses compete against each other for customers, resources, and market share. This environment is shaped by factors like rivals, new entrants, substitute products, and the bargaining power of suppliers and customers. While competition drives innovation and efficiency, it also creates significant pressure and risks for organizations.

Advantages of a Competitive Environment for an Organization:

1. Drives Innovation and Improvement:

- **Explanation:** The constant pressure to stay ahead of rivals forces organizations to innovate in products, services, and processes.
- **Example:** The fierce competition between Apple and Samsung in the smartphone market has led to rapid advancements in camera technology, processing power, and display quality.

2. Enhances Efficiency and Lowers Costs:

- **Explanation:** To offer competitive prices, organizations are compelled to streamline operations, reduce waste, and adopt cost-effective technologies, leading to higher productivity.
- **Example:** The airline industry is highly competitive, forcing carriers to optimize fuel consumption, streamline booking processes, and improve turnaround times at airports to keep costs and fares low.

3. Improves Customer Focus and Service:

- **Explanation:** In a competitive market, customers have choices. To attract and retain them, organizations must improve customer service, offer better quality, and be more responsive to customer needs.
- **Example:** E-commerce companies like Amazon have set a high standard for delivery times and return policies, forcing other retailers to match these services to remain competitive.

4. Motivates Employees and Management:

- **Explanation:** A clear competitive threat can foster a sense of urgency and purpose within the organization, motivating teams to perform at their best and be more goal-oriented.

Disadvantages of a Competitive Environment for an Organization:

1. Pressure on Profit Margins:

- **Explanation:** Intense price competition can lead to price wars, severely squeezing profit margins and making it difficult for companies, especially smaller ones, to survive.
- **Example:** Local retailers often struggle to compete on price with large chains like Walmart, which can leverage economies of scale to offer lower prices.

2. High Risk and Uncertainty:

- **Explanation:** The actions of competitors are unpredictable. A rival's breakthrough innovation or aggressive marketing campaign can suddenly render a company's products obsolete or uncompetitive.

- **Example:** The rise of digital cameras decimated the market for film-based cameras, leading to the decline of giants like Kodak.

3. **Short-Term Focus:**

- **Explanation:** The relentless pressure to meet quarterly targets and respond to immediate competitive threats can force management to focus on short-term gains at the expense of long-term strategic investments, such as R&D and employee development.

4. **Unethical Behavior and Hyper-Competitiveness:**

- **Explanation:** In extreme cases, the drive to win can lead to unethical practices such as industrial espionage, false advertising, poaching of key employees, or creating negative campaigns against competitors, damaging the industry's reputation as a whole.

5. **High Stress and Employee Burnout:**

- **Explanation:** A perpetually competitive atmosphere can create a high-stress work environment, leading to employee burnout, high turnover, and decreased job satisfaction.

12. What is Decision Support System (DSS)? Explain application of DSS. (10 Marks)

A Decision Support System (DSS) is an interactive, computer-based information system designed to help decision-makers utilize data and models to solve semi-structured and unstructured problems. It does not automate decision-making but provides powerful tools and analysis to support and enhance the human judgment process.

Key Characteristics of a DSS:

- **Interactive:** The user interacts with the system, changing inputs and parameters to see different outcomes.
- **Uses Data and Models:** It combines raw data from internal and external sources with analytical models (e.g., statistical, financial, optimization).
- **For Semi-Structured Problems:** It is best suited for problems that have both structured elements (which can be computed) and unstructured elements (which require human judgment).
- **Supports, Does Not Replace:** Its goal is to assist managers in making more effective decisions, not to make the decision for them.

Components of a DSS:

1. **Data Management Module:** A database or data warehouse containing relevant data from internal TPS/MIS and external sources.
2. **Model Management Module:** A library of mathematical and analytical models (e.g., forecasting, simulation, optimization models).
3. **User Interface (Dialog Module):** The tool that allows the user to interact with the system, input parameters, and view results in a user-friendly way, often through charts and graphs.

Applications of Decision Support Systems (DSS):

1. **Healthcare: Clinical Decision Support Systems**
 - **Application:** Doctors use DSS to assist in diagnosing diseases. The system can analyze a patient's symptoms, medical history, and lab results against a vast database of medical knowledge to suggest possible diagnoses and treatment options, helping to reduce diagnostic errors.
2. **Supply Chain and Logistics: Optimization and Routing**
 - **Application:** Companies like Amazon and FedEx use DSS to optimize their delivery routes. The system analyzes package volume, delivery locations, traffic patterns, and truck capacity to determine the most efficient routes, saving time and fuel costs.
3. **Agriculture: Crop Planning and Yield Management**
 - **Application:** Farmers use DSS that integrates data on soil conditions, weather forecasts, commodity prices, and seed types. The system can model different planting and harvesting scenarios to help the farmer decide which crops to plant and when to sell them to maximize profit.
4. **Banking and Finance: Credit Scoring and Loan Approval**
 - **Application:** Banks use DSS to evaluate the creditworthiness of loan applicants. The system analyzes the applicant's income, credit history, debt, and other

financial data using a statistical model to generate a credit score and recommend whether to approve or deny the loan.

5. Business: "What-If" Analysis and Forecasting

- **Application:** A company planning to launch a new product can use a DSS to model the financial impact. Managers can change variables like unit cost, sale price, and marketing budget to see how these changes would affect projected revenue and profitability, helping them set an optimal strategy.

6. Energy Management: Power Grid Optimization

- **Application:** Utility companies use DSS to manage the electrical grid. The system forecasts electricity demand based on weather and time of day and then models the most cost-effective way to allocate power from various sources (coal, natural gas, solar, wind) to meet the demand reliably.

Chapter 2: Data & Knowledge Management, Business Intelligence

13. Explain Data Warehouse & Data Mart. Give two examples which show generation of Big Data. (10 Marks)

A **Data Warehouse** is a large, centralized repository designed to store, manage, and analyze historical data from multiple disparate sources within an organization. Its primary purpose is to support business intelligence (BI) activities, reporting, and data analysis. Data is integrated, time-variant (historical), non-volatile (not updated frequently), and subject-oriented (e.g., focused on sales, customers).

A **Data Mart** is a subset of a data warehouse, designed to serve the specific needs of a particular department, business unit, or line of business (e.g., marketing, finance, sales). It is smaller, more focused, and typically contains a subset of the data stored in the enterprise data warehouse.

Feature	Data Warehouse	Data Mart
Scope	Enterprise-wide, centralized	Department-specific, decentralized
Data Sources	Multiple, diverse sources	Fewer sources, often from the data warehouse
Subject	Multiple subjects	Focused on a single subject
Size	Very Large (TB to PB)	Small to Medium (GB to TB)
Implementation Time	Long (months to years)	Shorter (weeks to months)

Examples of Big Data Generation:

1. Social Media Platforms (e.g., Facebook, Twitter):

- Every second, millions of users generate an enormous volume of data through posts, likes, shares, comments, uploaded photos, and videos.
- This data is characterized by high **Volume** (terabytes per day), **Velocity** (real-time streaming), and **Variety** (text, images, video, metadata), making it a classic source of Big Data used for sentiment analysis, targeted advertising, and trend spotting.

2. Autonomous Vehicles (Self-Driving Cars):

- A single autonomous vehicle is equipped with numerous sensors, cameras, LIDAR, and GPS systems that continuously collect data about its surroundings, road conditions, and vehicle performance.
- It can generate **several terabytes of data in just a few hours of driving**. This data exhibits the key characteristics of Big Data: extreme **Volume**, high **Velocity** (real-time processing is critical), and wide **Variety** (sensor data, image streams, geographic data).

14. What is Big Data? Explain its characteristics and challenges. (10 Marks)

Big Data refers to extremely large and complex datasets that are beyond the processing capabilities of traditional data management tools. It is not just about the size, but about the holistic ecosystem of technologies and methods needed to capture, store, distribute, manage, and analyze these datasets to extract valuable insights.

Characteristics of Big Data (The 5 V's):

1. **Volume:** This refers to the immense scale of data generated every second from various sources like social media, business transactions, machines, and sensors. The size of the data is what typically makes it "Big."
 - *Example:* The data generated by the Large Hadron Collider (LHC) is about 25 petabytes annually.
2. **Velocity:** This refers to the speed at which data is generated, collected, and processed. Big Data is often generated in real-time or near-real-time and requires rapid ingestion and analysis.
 - *Example:* Stock trading systems analyze millions of market changes per second to execute high-frequency trades.
3. **Variety:** This refers to the different types and formats of data. Big Data includes structured data (e.g., databases), semi-structured data (e.g., XML, JSON logs), and unstructured data (e.g., emails, videos, social media posts).
 - *Example:* A customer's profile includes structured data (name, ID), semi-structured data (web clickstream), and unstructured data (customer service call recordings).
4. **Veracity:** This refers to the quality, accuracy, trustworthiness, and reliability of the data. Big Data often comes from noisy and unreliable sources, making data cleansing and validation a significant challenge.
 - *Example:* Data from social media can contain biases, misinformation, and spelling errors, affecting the accuracy of sentiment analysis.
5. **Value:** This is the most important characteristic. It refers to the worth of the data being extracted. The ultimate goal of working with Big Data is to derive meaningful and actionable insights that create business or societal value.
 - *Example:* Netflix uses viewing data to recommend shows, increasing customer engagement and retention.

Challenges of Big Data:

1. **Data Capture and Storage:** Storing petabytes of data in a scalable, cost-effective manner is a major hurdle. Traditional relational databases are often insufficient.
2. **Data Cleaning and Integration:** Preparing messy, heterogeneous data for analysis is time-consuming and can take up to 80% of a data scientist's effort.
3. **Data Analysis and Skills Gap:** Extracting meaningful insights requires sophisticated tools (like Hadoop, Spark) and skilled professionals (like data scientists), who are in short supply.
4. **Data Security and Privacy:** Large datasets are attractive targets for cyberattacks. Ensuring the privacy of individuals whose data is being collected and analyzed is a critical ethical and legal challenge (e.g., GDPR).
5. **Data Silos and Governance:** Data is often trapped in departmental silos, making it difficult to get a unified view. Establishing clear data governance policies is essential for managing Big Data effectively.

15. Analyze the impact of Business Intelligence (BI) on decision making. (10 Marks)

Business Intelligence (BI) is a technology-driven process for analyzing data and presenting actionable information to help corporate executives, business managers, and other end users make more informed strategic and tactical decisions. Its impact has transformed decision-making from an intuition-based art to a data-driven science.

Impact of BI on Decision-Making:

1. Shift from Reactive to Proactive Decision-Making:

- **Impact:** Traditional reporting often tells you what *already happened*. BI tools, with features like forecasting and predictive analytics, allow organizations to anticipate trends, customer behavior, and potential problems.
- **Example:** A retailer using BI can predict inventory shortages before they occur and proactively place orders, avoiding stock-outs and lost sales.

2. Improved Speed and Accuracy of Decisions:

- **Impact:** BI systems provide real-time dashboards and reports, giving decision-makers immediate access to key performance indicators (KPIs). This eliminates the lag of manual data compilation and reduces the risk of human error.
- **Example:** A sales manager can see live sales data for the quarter and instantly identify underperforming regions, allowing for quick strategy adjustments.

3. Democratization of Data and Decentralized Decision-Making:

- **Impact:** Modern, user-friendly BI tools (like Tableau, Power BI) empower non-technical users across departments to access and analyze data themselves. This pushes decision-making authority closer to the front lines.
- **Example:** A marketing executive can create their own reports to analyze campaign performance without relying on the IT department, leading to faster, more agile marketing decisions.

4. Support for Strategic, Tactical, and Operational Decisions:

- **Strategic:** BI helps top management identify long-term market opportunities and threats by analyzing macro trends.
- **Tactical:** Middle managers use BI to optimize departmental performance, such as setting the right marketing budget or staffing levels.
- **Operational:** Front-line employees use BI dashboards to manage daily tasks, like a call center agent seeing a customer's complete history to resolve an issue faster.

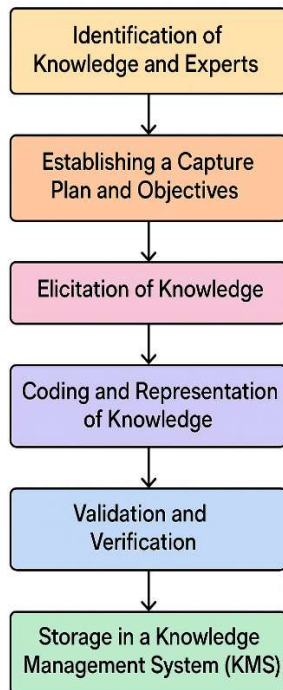
5. Unification of Organizational View:

- **Impact:** BI systems integrate data from various sources (sales, finance, operations) into a "single version of the truth." This breaks down departmental silos and enables decisions that consider the entire organization's health, rather than just one function.
- **Example:** Before launching a new product, executives can use a unified BI view to assess the impact on manufacturing capacity, supply chain logistics, and financial projections simultaneously.

16. Explain the steps involved in knowledge capturing. (10 Marks)

Knowledge capturing is the process of extracting knowledge from human experts, documents, and other sources so it can be stored, shared, and used within a Knowledge Management System (KMS). It is a critical first step in preserving valuable organizational know-how, especially from retiring experts.

Steps Involved in Knowledge Capturing:



1. Identification of Knowledge and Experts:

- This initial step involves determining what knowledge is critical to capture and identifying the key experts who possess that knowledge. This can be done through organizational charts, manager recommendations, and reputation.
- *Example:* A company identifies that a senior engineer due to retire in six months is the only one with deep expertise in a legacy manufacturing process.

2. Establishing a Capture Plan and Objectives:

- Define the scope, goals, and timeline for the knowledge capture initiative. This includes deciding on the format (e.g., written manual, video, interactive database) and the key topics to be covered.
- *Example:* The plan is to capture the engineer's knowledge on troubleshooting a specific machine, with the objective of creating a searchable digital manual for junior engineers.

3. Elicitation of Knowledge:

- This is the core activity where knowledge is drawn out from the expert. Various techniques are used:
 - **Interviews:** Structured or unstructured conversations to gather detailed information.
 - **Observation:** Watching the expert perform a task to capture tacit, "how-to" knowledge that they may not be able to articulate easily.
 - **Protocol Analysis (Think-Aloud Method):** The expert verbalizes their thought process while solving a problem.
 - **Document Analysis:** Reviewing existing documents, reports, and notes created by the expert.

4. Coding and Representation of Knowledge:

- The raw, captured knowledge is then organized, structured, and coded into a formal representation that can be stored in a KMS. This could involve:
 - Creating **decision trees** for troubleshooting.
 - Writing **procedural documents** or **FAQs**.
 - Building a **knowledge base** with articles and how-to guides.
 - Developing **case-based reasoning** systems.

5. Validation and Verification:

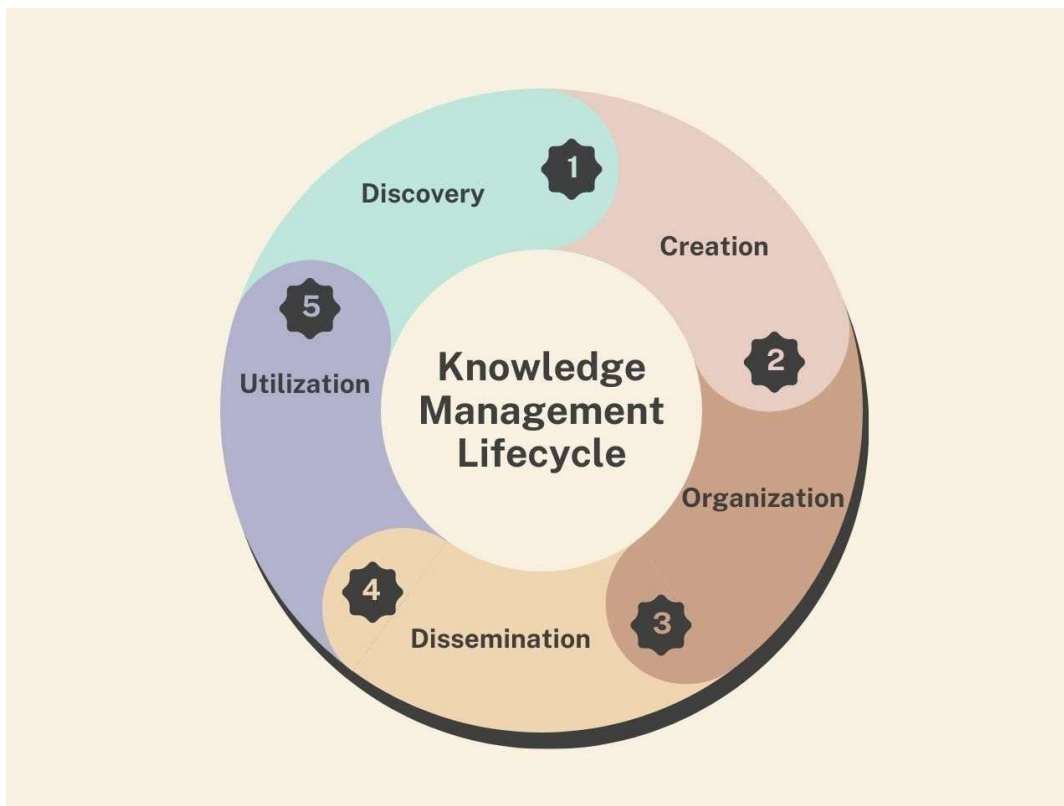
- The captured and coded knowledge must be checked for accuracy, completeness, and consistency. This is often done by having other subject matter experts review the material or by testing the knowledge in real-world scenarios.
- *Example:* A newly created troubleshooting guide is given to a junior engineer to use on a real machine malfunction to see if it leads to the correct solution.

6. Storage in a Knowledge Management System (KMS):

- The final, validated knowledge is then stored in a central repository (the KMS) where it can be easily accessed, searched, and updated by other employees in the organization. This makes the captured knowledge a reusable organizational asset.

17. Illustrate Knowledge Management life cycle. (10 Marks)

The Knowledge Management (KM) Life Cycle is a framework that describes the key processes involved in managing knowledge throughout its lifespan within an organization. It ensures that knowledge is effectively created, shared, and applied to achieve business goals. One widely accepted model consists of the following four key stages:



The Knowledge Management Life Cycle:

1. Discovery & Creation (Capture):

- This is the starting point where new knowledge is identified, generated, or captured. Knowledge can be discovered from external sources (research, competitors) or created internally (R&D, employee insights).
- **Tacit Knowledge** is captured from experts through interviews and observation.
- **Explicit Knowledge** is created through documentation, reports, and data analysis.
- *Key Activity*: Eliciting knowledge from departing experts, conducting research, and documenting best practices.

2. Organization & Storage:

- Once captured, knowledge must be organized, categorized, and stored in a structured manner so it can be easily retrieved. This involves codifying tacit knowledge into explicit forms.
- Knowledge is stored in repositories like databases, intranets, document management systems, and wikis.
- *Key Activity*: Creating a taxonomy, indexing documents, building a knowledge base, and using metadata for easy search and retrieval.

3. Sharing & Dissemination:

- This is the most crucial stage for adding value. Organized knowledge is distributed and made accessible to the people who need it, when they need it. This stage focuses on breaking down knowledge silos.
- Mechanisms include collaboration tools (Microsoft Teams, Slack), communities of practice, training sessions, and content management systems.
- *Key Activity*: Setting up a corporate wiki, hosting knowledge-sharing webinars, and creating a culture of collaboration.

4. Application & Refinement:

- The ultimate goal of KM is for knowledge to be applied to solve problems, make better decisions, and improve processes. This stage closes the loop, as the application of knowledge often leads to the creation of new knowledge.
- Employees use the stored knowledge to perform their jobs more effectively. Feedback from application is used to update, correct, and refine the existing knowledge base.
- *Key Activity*: Using a knowledge base to troubleshoot a client issue, applying a best-practice template to a new project, and updating procedures based on lessons learned.

This cycle is iterative and continuous. The "Refinement" from stage 4 feeds directly back into stage 1, as applied knowledge leads to new insights and discoveries, starting the cycle anew.

18. Explain the challenges faced by Knowledge Management in different business scenarios. (5 Marks)

Implementing Knowledge Management (KM) is not a one-size-fits-all process and faces unique challenges across different business contexts.

Key Challenges in Different Scenarios:

1. In Multinational Corporations (MNCs):

- **Challenge:** Geographic and cultural dispersion creates "silos." Tacit knowledge is difficult to share across time zones and languages. A "one-size-fits-all" KM system may not account for regional differences in work practices and communication styles.

2. In Organizations with High Employee Turnover:

- **Challenge:** Critical tacit knowledge is constantly "walking out the door." The KM system struggles to capture knowledge faster than it is lost, leading to repeated mistakes and loss of organizational memory.

3. In Mergers and Acquisitions:

- **Challenge:** Integrating different organizational cultures and legacy KM systems. Employees from different companies may be reluctant to share knowledge or adopt a new, unified system, hindering the synergy the merger was supposed to create.

4. In Research & Development (R&D) and Innovation-Driven Firms:

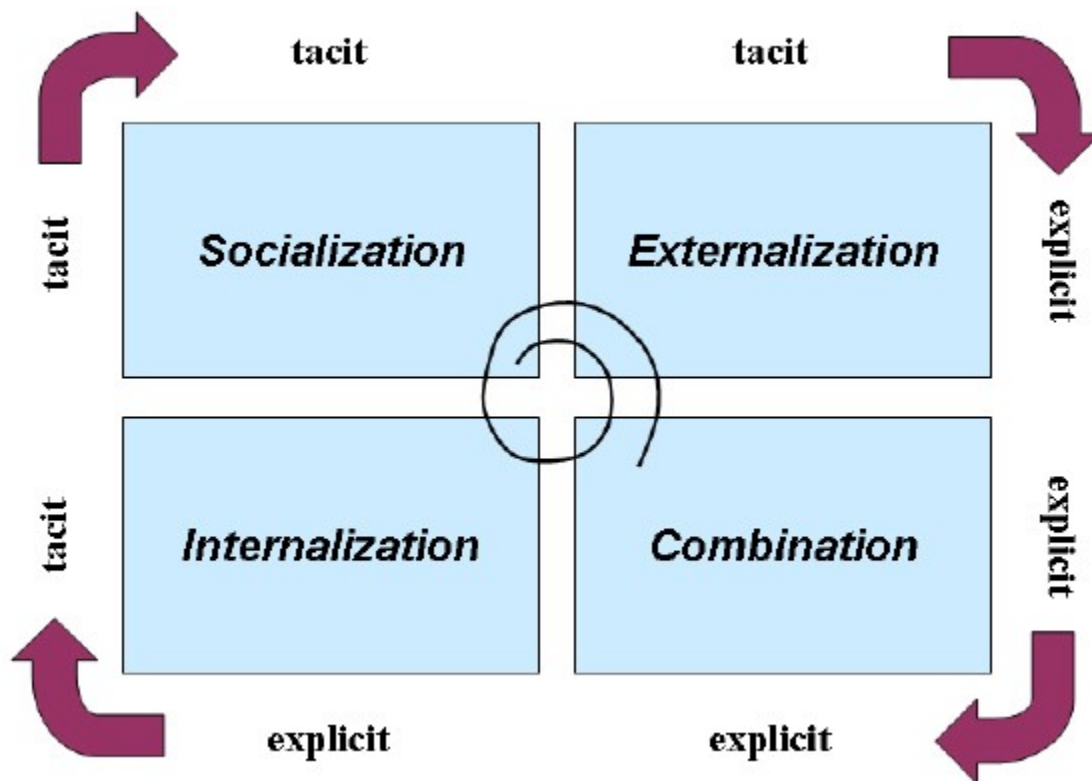
- **Challenge:** Capturing the highly tacit and experimental knowledge of the innovation process. Researchers may focus on creating new knowledge but lack the incentive or time to document their failed experiments and informal insights, which are valuable for future projects.

5. In Traditional, Hierarchical Organizations:

- **Challenge:** A culture where knowledge is power, leading to knowledge hoarding. Employees may be reluctant to share their expertise for fear of losing their competitive advantage or status within the company. Lack of top-management support can also starve KM initiatives of necessary resources.

19. Explain different types of knowledge and the four modes of knowledge conversion. (10 Marks)

In Knowledge Management, understanding the types of knowledge and how they are converted is fundamental. The most widely cited model is the SECI model by Nonaka and Takeuchi.



Types of Knowledge:

1. Explicit Knowledge:

- This is knowledge that is easily codified, documented, and transmitted in a formal, systematic language. It is objective and rational.
- *Examples:* Manuals, textbooks, procedures, formulas, databases, and reports.

2. Tacit Knowledge:

- This is personal, context-specific, and hard to formalize and communicate. It consists of insights, intuitions, hunches, and skills rooted in action and experience. It is subjective and experiential.
- *Examples:* The skill of a master craftsman, a surgeon's intuitive judgment, or the ability to navigate office politics.

The Four Modes of Knowledge Conversion (SECI Model):

The SECI model describes how tacit and explicit knowledge interact and are converted into new knowledge within an organization.

1. Socialization (Tacit to Tacit):

- This is the process of sharing tacit knowledge through direct, shared experiences, such as spending time together, apprenticeships, and imitation.
- *Example:* A senior chef apprentices a junior chef, who learns cooking techniques and "secrets" not found in any recipe book by observing and practicing alongside the master.

2. Externalization (Tacit to Explicit):

- This is the process of articulating tacit knowledge into explicit concepts. This is the most challenging conversion, often using metaphors, analogies, and models.
- *Example:* The chef writes a detailed recipe book, attempting to put their intuitive cooking skills and "pinch of salt" into precise measurements and instructions.

3. **Combination (Explicit to Explicit):**

- This is the process of systematizing and combining different pieces of explicit knowledge to create new, more complex explicit knowledge. This involves sorting, adding, reconfiguring, and disseminating explicit knowledge.
- *Example:* A food scientist takes the chef's recipe book, combines it with nutritional data and food cost analysis from other documents to create a new, optimized menu and training program for the entire restaurant chain.

4. **Internalization (Explicit to Tacit):**

- This is the process of embodying explicit knowledge into tacit knowledge. It is closely related to "learning by doing." As individuals read, study, and practice, they internalize explicit knowledge and broaden their own tacit knowledge base.
- *Example:* A new cook in the chain reads the training program and repeatedly practices the recipes. Over time, they internalize the skills and develop their own tacit understanding and intuition for the dishes.

This SECI spiral is continuous, with each mode feeding into the next, creating an expanding cycle of organizational knowledge creation.

20. How is the quality of data ensured in an organization? (10 Marks)

Data Quality (DQ) is a perception of the fitness of data for use in its intended context. Ensuring high-quality data is a continuous process involving a set of practices, policies, and technologies. Poor data quality leads to flawed analysis, bad decisions, and operational inefficiencies.

Measures to Ensure Data Quality:

1. Establishing a Data Governance Framework:

- This is the foundation. It involves creating a formal structure with defined roles (e.g., Data Stewards, Data Owners) and policies that oversee the management and quality of data assets. A Data Governance Council sets the strategy and rules.

2. Defining Data Quality Dimensions and Metrics:

- Organizations must define what "quality" means for their data by using specific, measurable dimensions:
 - **Accuracy:** Does the data correctly represent the real-world object or event? (e.g., Is the customer's name spelled correctly?)
 - **Completeness:** Is all the necessary data present? (e.g., Is the 'Address' field populated for every customer?)
 - **Consistency:** Does data remain uniform across different systems? (e.g., Is the customer status the same in the sales and support databases?)
 - **Timeliness:** Is the data up-to-date and available when needed? (e.g., Is inventory data refreshed in real-time?)
 - **Uniqueness:** Are there no duplicate records? (e.g., Is a customer represented only once in the database?)

3. Implementing Data Profiling and Cleansing:

- **Data Profiling:** The process of examining the existing data to understand its structure, content, and quality issues. This is the diagnostic step.
- **Data Cleansing (Scrubbing):** The process of correcting, standardizing, and de-duplicating records identified during profiling. This is the corrective step.

4. Data Validation at the Point of Entry:

- Implementing strict validation rules in applications and forms to prevent bad data from entering the system in the first place.
- *Examples:* Drop-down lists for "State," format checks for email addresses, and mandatory field checks.

5. Master Data Management (MDM):

- MDM is a comprehensive method of defining and managing an organization's critical data (e.g., Customer, Product, Employee) to provide a single, trusted "golden record" across the enterprise. This directly addresses consistency and uniqueness.

6. Continuous Monitoring and Auditing:

- Data quality is not a one-time project. Organizations must implement automated tools to continuously monitor DQ metrics, generate reports on data health, and conduct periodic audits to ensure ongoing compliance with data standards.

21. Explain Data Warehouse in an organization. (10 Marks)

A **Data Warehouse** is a central repository of integrated, historical data from multiple disparate sources within an organization. It is specifically designed for query, analysis, and reporting—not for transaction processing. Its primary purpose is to provide a unified, "single version of the truth" to support business intelligence and informed decision-making.

Key Characteristics of a Data Warehouse (Bill Inmon's Definition):

- **Subject-Oriented:** Data is organized around key subjects of the business, such as customers, products, sales, and costs, rather than by application (e.g., billing, inventory).
- **Integrated:** Data is collected from various source systems (e.g., CRM, ERP, HR) and made consistent. For example, a "gender" field from different systems might be standardized to 'M' and 'F'.
- **Time-Variant:** All data in the warehouse is accurate as of some point in time. Historical data is stored, allowing for analysis of trends and changes over time (e.g., sales data for the last 5-10 years).
- **Non-Volatile:** Once data is entered into the warehouse, it is not updated or changed in place. Data is loaded and accessed for read-only purposes, ensuring a stable environment for analysis.

Architecture of a Data Warehouse:

1. **Data Sources:** Operational systems like Transaction Processing Systems (TPS), CRM, ERP, and external data feeds.
2. **Extraction, Transformation, and Loading (ETL) Process:**
 - **Extract:** Data is pulled from the source systems.
 - **Transform:** Data is cleaned, standardized, integrated, and formatted for the warehouse.
 - **Load:** The transformed data is loaded into the data warehouse.
3. **Data Warehouse Storage:** The central repository where the integrated, historical data is stored. It is often structured using a **star schema** or **snowflake schema**, which organizes data into **Fact Tables** (containing measurable metrics like sales amount) and **Dimension Tables** (containing descriptive attributes like product, time, customer).
4. **Data Marts:** Optional, smaller subsets of the data warehouse tailored for specific business units (e.g., a marketing data mart).
5. **Front-End Applications (BI Tools):** The user interface where analysts and managers access the data through tools like SQL queries, dashboards, reporting tools, and data mining applications (e.g., Tableau, Power BI).

Benefits to an Organization:

- Provides a consolidated, consistent view of the enterprise.
- Enables historical trend analysis.
- Improves the quality and consistency of data.
- Frees up operational systems by offloading complex queries and reports.
- Empowers users to make data-driven decisions based on a reliable foundation.

22. Compare and contrast Web 1.0, Web 2.0, and Web 3.0. (10 Marks)

Feature	Web 1.0 (Read-Only Web)	Web 2.0 (Read-Write Web)	Web 3.0 (Read-Write-Execute Web)
1. Time Period	~1990–2004	~2004 – Present	Emerging (Present–Future)
2. Core Purpose	Deliver static information	Enable interaction, collaboration, sharing	Provide decentralized, intelligent, user-owned digital ecosystem
3. User Role	Passive consumers	Active participants & contributors	Owners of data, identity, and digital assets
4. Key Technologies	Static HTML, basic CSS, simple servers	AJAX, JavaScript, APIs, Cloud, Mobile-first	Blockchain, AI, Semantic Web, Smart Contracts
5. Content Source	Publisher-created, centralized	User-generated but platform-controlled	Decentralized, user-owned content on distributed networks
6. Data Ownership	Stored in silos by website owners	Users create data but platforms (Meta, Google) control it	Users have self-sovereign data via cryptographic keys
7. Monetization Model	Banner ads, subscription	Targeted ads, freemium models, influencer economy	Tokens, cryptocurrencies, NFTs, decentralized finance (DeFi)
8. Website Structure	Static pages with limited interactivity	Dynamic, interactive web apps	Intelligent, automated, decentralized applications (dApps)
9. Examples	Early Yahoo, Britannica Online, Static blogs	Facebook, YouTube, Wikipedia, Instagram	Brave Browser (BAT), Ethereum dApps, Decentraland
10. Interaction Model	One-way communication	Two-way communication (social media, comments)	Multi-way, autonomous interaction using AI & decentralized protocols

23. Create an MIS for any hospital. (10 Marks)

A Hospital Management Information System (HMIS) is a comprehensive, integrated system designed to manage the administrative, financial, and clinical aspects of a hospital. Its goal is to streamline operations, improve patient care, and enhance decision-making.

Proposed MIS for "City General Hospital":

1. Core Sub-Systems (Modules):

- **Patient Management System:**
 - **Function:** Manages the entire patient lifecycle from registration and appointment scheduling to discharge and follow-up.
 - **Components:** Patient demographics, appointment scheduling, admission/discharge/transfer (ADT), billing interface.
- **Clinical Information System (CIS):**
 - **Function:** The core of clinical care, managing patient health information.
 - **Components:** Electronic Health Records (EHR), Computerized Physician Order Entry (CPOE), Clinical Decision Support System (CDSS), Nursing documentation.
- **Laboratory Information System (LIS):**
 - **Function:** Manages the workflow and data of the hospital's laboratory.
 - **Components:** Test order management, specimen tracking, results entry (automated from lab equipment), and results reporting to the CIS.
- **Pharmacy Information System:**
 - **Function:** Manages medication-related processes.
 - **Components:** Electronic prescribing, drug inventory management, drug interaction checks, billing for medications.
- **Radiology Information System (RIS):**
 - **Function:** Manages medical imaging orders and data.
 - **Components:** Scheduling of imaging procedures, tracking radiology reports, integration with Picture Archiving and Communication System (PACS).
- **Financial and Billing System:**
 - **Function:** Handles the hospital's financial operations.
 - **Components:** Insurance claim processing, payroll, accounts payable/receivable, general ledger, and integration with patient billing.

2. Data Flow and Integration: All sub-systems are integrated through a central database. For example:

- A doctor enters a lab test order in the **CIS**.
- The order is electronically sent to the **LIS**.
- After the test is completed, the results are automatically fed back into the patient's record in the **CIS**.

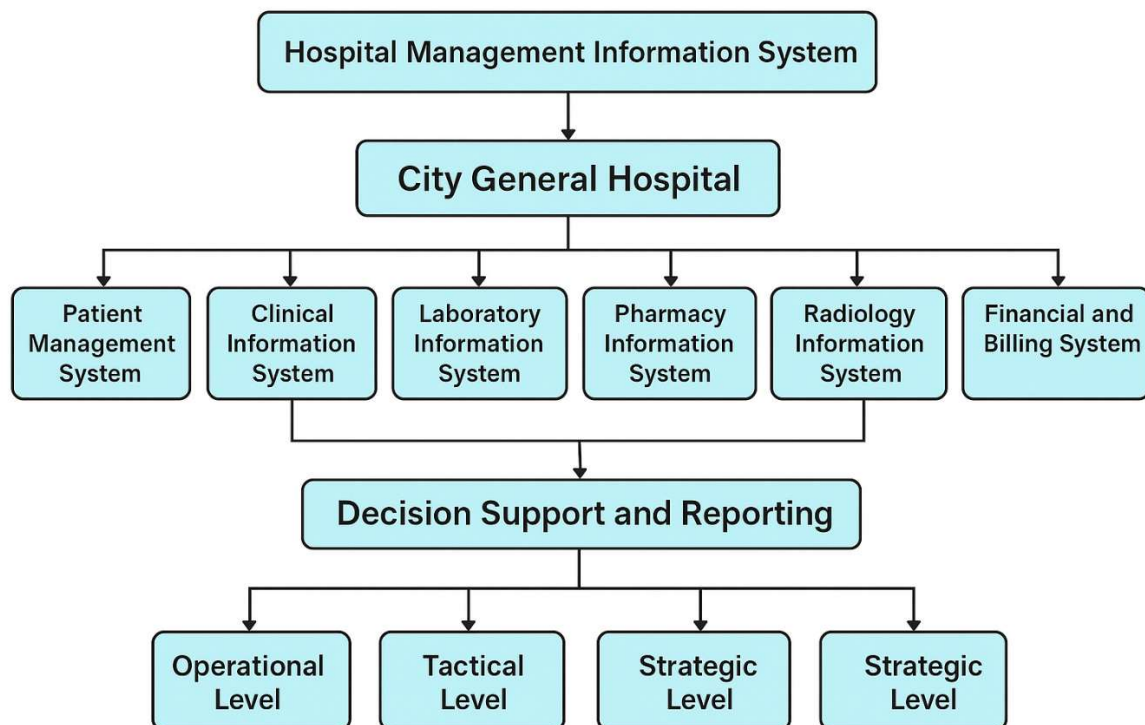
- The billing information for the test is sent to the **Financial System**.

3. Decision Support and Reporting (The "Management" Layer): The HMIS provides key reports and dashboards for different levels of management:

- **Operational Level (Nurse Supervisor):** Daily bed occupancy report, nurse-to-patient ratio report.
- **Tactical Level (Department Heads):** Departmental performance reports (e.g., lab test turnaround time), resource utilization reports.
- **Strategic Level (Hospital Administration):** Executive dashboard with KPIs like Average Length of Stay (ALOS), Patient Readmission Rate, Hospital Acquired Infection Rate, and overall Financial Performance.

Benefits of this HMIS:

- **Improved Patient Care:** Reduces medical errors, provides quick access to patient records.
- **Operational Efficiency:** Automates workflows, reduces paperwork, and improves coordination between departments.
- **Enhanced Decision-Making:** Provides real-time data for resource allocation and strategic planning.
- **Financial Control:** Improves billing accuracy and reduces revenue cycle time.



24. What are the different types of MIS? (5 Marks)

Management Information Systems (MIS) can be categorized based on the organizational level they support and the nature of the decisions they aid. The primary types form a hierarchy that aligns with the organizational structure.

Different Types of MIS:

1. Transaction Processing System (TPS):

- Serves the operational level by processing daily, high-volume, routine transactions. It is the data source for other systems.
- *Example:* A system for processing patient admissions, sales orders, or payroll.

2. Management Information System (MIS - in a narrow sense):

- Serves middle management by providing structured summary reports and routine reports based on data from the TPS.
- *Example:* A weekly sales summary report or a monthly budget vs. actual expense report.

3. Decision Support System (DSS):

- Serves middle and senior management by providing analytical models and data analysis tools to solve semi-structured problems.
- *Example:* A "what-if" analysis model to determine the impact of a price change on profitability.

4. Executive Support System (ESS):

- Serves senior management by providing a broad, aggregated view of the organization's performance and its external environment for strategic decision-making.
- *Example:* A digital dashboard displaying key performance indicators (KPIs) like market share and overall company health.

25. Analyze briefly to highlight the difference between Web 2.0 and Web 3.0? (10 Marks)

Feature	Web 2.0 (Read-Write Web)	Web 3.0 (Read-Write-Execute Web)
1. Time Period	~2004 – Present	Emerging (Present–Future)
2. Core Purpose	Enable interaction, collaboration, sharing	Provide decentralized, intelligent, user-owned digital ecosystem
3. User Role	Active participants & contributors	Owners of data, identity, and digital assets
4. Key Technologies	AJAX, JavaScript, APIs, Cloud, Mobile-first	Blockchain, AI, Semantic Web, Smart Contracts
5. Content Source	User-generated but platform-controlled	Decentralized, user-owned content on distributed networks
6. Data Ownership	Users create data but platforms (Meta, Google) control it	Users have self-sovereign data via cryptographic keys
7. Monetization Model	Targeted ads, freemium models, influencer economy	Tokens, cryptocurrencies, NFTs, decentralized finance (DeFi)
8. Website Structure	Dynamic, interactive web apps	Intelligent, automated, decentralized applications (dApps)
9. Examples	Facebook, YouTube, Wikipedia, Instagram	Brave Browser (BAT), Ethereum dApps, Decentraland
10. Interaction Model	Two-way communication (social media, comments)	Multi-way, autonomous interaction using AI & decentralized protocols

26. How is data governance achieved in case of MIS? (5 Marks)

Data governance in the context of a Management Information System (MIS) is the exercise of authority, control, and shared decision-making over the management of data assets to ensure data is secure, accurate, available, and usable. It's the framework that turns data into a trusted, strategic asset.

How Data Governance is Achieved for an MIS:

1. **Establish a Governance Framework:** Create a formal structure with defined roles and responsibilities, such as a **Data Governance Council** (sets strategy and policies), **Data Stewards** (subject matter experts who define and manage data), and **Data Custodians** (IT staff who implement and maintain the technical environment).
2. **Define Data Policies and Standards:** Develop clear, organization-wide policies for data quality, data security, data privacy, data access, and data lifecycle management (creation, storage, archival, deletion). This includes defining standard data definitions (a common business vocabulary).
3. **Implement Data Quality Management:** Integrate processes for continuous data profiling, cleansing, and monitoring. This ensures the data feeding into the MIS is accurate, complete, and consistent, which is critical for reliable reporting and decision-making.
4. **Manage Metadata:** Create a central repository (metadata dictionary) that documents the data within the MIS—what it means, where it comes from, how it's transformed, and who owns it. This makes the data understandable and trustworthy for all users.
5. **Ensure Security and Access Control:** Enforce strict security protocols and role-based access controls to ensure that only authorized personnel can view or modify specific data sets within the MIS, protecting sensitive information.

27. Highlight how a company can use Big Data to gain competitive advantage. (10 Marks)

A company can leverage Big Data to gain a sustainable competitive advantage by transforming vast amounts of data into actionable insights that drive smarter decisions, create new business models, and deliver superior customer value.

Ways to Gain Competitive Advantage with Big Data:

1. Hyper-Personalized Customer Experience:

- **How:** Analyze customer data (purchase history, browsing behavior, social media activity) to create highly targeted marketing campaigns and product recommendations.
- **Example:** Netflix uses Big Data to personalize the user interface and recommend shows for each individual, significantly increasing viewer engagement and reducing churn.

2. Optimized Supply Chain and Operations:

- **How:** Use sensor data (IoT), weather data, and traffic patterns to optimize logistics, predict inventory needs, and perform predictive maintenance on machinery.
- **Example:** UPS uses Big Data from sensors in its vehicles to optimize delivery routes (ORION system), saving millions of gallons of fuel and reducing delivery times.

3. Data-Driven Product Development and Innovation:

- **How:** Analyze customer feedback, product usage data, and market trends to identify unmet needs and guide the development of new features or entirely new products.
- **Example:** Procter & Gamble uses data from social media sentiment analysis and in-store sales to guide the development and marketing of new consumer products.

4. Dynamic Pricing and Revenue Management:

- **How:** Implement algorithms that analyze demand, competitor pricing, market conditions, and customer profiles in real-time to adjust prices dynamically.
- **Example:** Airlines and Uber constantly adjust their prices based on demand, time of day, and competitor activity to maximize revenue for each seat or ride.

5. Enhanced Risk Management and Fraud Detection:

- **How:** Analyze transaction patterns and user behavior in real-time to identify anomalies and fraudulent activities that would be impossible for humans to detect.
- **Example:** PayPal uses machine learning models on Big Data to analyze millions of transactions and identify fraudulent patterns, saving billions of dollars annually.

6. Competitive and Market Intelligence:

- **How:** Mine data from social media, news sources, and competitor websites to track brand sentiment, monitor competitor strategies, and identify emerging market trends faster than rivals.
- **Example:** A company can use web scraping and sentiment analysis to track public reaction to a competitor's new product launch and adjust its own strategy accordingly.

By embedding these data-centric practices into its core operations, a company can make more informed decisions, operate more efficiently, and create a more compelling value proposition, thereby establishing a significant edge over competitors.

Module 3 – Ethical Issues & Privacy

28. Identify measures to improve cybersecurity with examples. (10 Marks)

Improving cybersecurity requires a multi-layered approach that combines technological solutions, robust policies, and continuous user education to protect an organization's information systems from threats.

Key Measures to Improve Cybersecurity:

1. Implement Strong Access Control and Identity Management:

- **Measure:** Enforce the principle of least privilege and use Multi-Factor Authentication (MFA) for all critical systems.
- **Example:** An employee logging into the company network needs a password (something they know) and a code from an authenticator app on their phone (something they have).

2. Regular Software Patching and Vulnerability Management:

- **Measure:** Establish a rigorous process to regularly update and patch all operating systems, applications, and firmware to fix known security vulnerabilities.
- **Example:** A company uses a centralized patch management system to automatically deploy the latest Microsoft security updates to all employee laptops every month.

3. Employee Security Awareness Training:

- **Measure:** Conduct regular, mandatory training to educate employees about cyber threats like phishing, social engineering, and safe internet practices.
- **Example:** The IT department sends simulated phishing emails to employees and provides immediate feedback and training to those who click on the malicious link.

4. Deploy Advanced Endpoint and Network Security Tools:

- **Measure:** Use next-generation firewalls (NGFW), intrusion detection/prevention systems (IDS/IPS), and endpoint detection and response (EDR) software to monitor and block malicious activity.
- **Example:** An EDR solution on an employee's computer detects and isolates a ransomware attack before it can encrypt files and spread across the network.

5. Maintain Robust Data Backup and Recovery Plans:

- **Measure:** Follow the 3-2-1 backup rule: keep at least three copies of data, on two different media, with one copy stored off-site and offline.
- **Example:** A company performs nightly incremental backups to a cloud service and weekly full backups to a physically disconnected external hard drive stored in a safe, ensuring they can recover from a ransomware attack without paying the ransom.

6. Develop and Test an Incident Response Plan:

- **Measure:** Have a clear, documented plan that outlines the steps to take when a security breach occurs, including roles, responsibilities, and communication protocols.
- **Example:** After discovering a data breach, the company's incident response team immediately activates the plan, containing the breach, eradicating the threat, and notifying affected customers as required by law.

29. Analyze the main reasons for computer crimes. (10 Marks)

Computer crimes, or cybercrimes, are motivated by a complex interplay of factors ranging from financial gain to ideological beliefs. Understanding these root causes is essential for developing effective prevention strategies.

Main Reasons for Computer Crimes:

1. Financial Gain (The Primary Driver):

- **Analysis:** The digital world offers immense and low-risk financial opportunities for criminals. The potential for high rewards with a low probability of being caught is a powerful motivator.
- **Examples:**
 - **Ransomware:** Encrypting a company's data and demanding a cryptocurrency payment for its release.
 - **Phishing & Business Email Compromise (BEC):** Tricking employees into transferring money to fraudulent accounts.
 - **Stealing and Selling Financial Data:** Credit card numbers, bank account details, and login credentials are sold on the dark web.

2. Espionage (Political, Economic, or Corporate):

- **Analysis:** Nation-states and competing corporations engage in cyber espionage to steal intellectual property, trade secrets, and classified government information to gain a strategic, economic, or military advantage.
- **Examples:**
 - A state-sponsored group hacks a defense contractor to steal designs for a new fighter jet.
 - A company infiltrates a competitor's network to gain access to its product roadmap and pricing strategies.

3. Ideology and Activism (Hacktivism):

- **Analysis:** Some individuals or groups are motivated by political, religious, or social ideologies. They use cyber-attacks as a form of protest to disrupt organizations or governments they oppose and to promote their own agenda.
- **Examples:**
 - Groups like "Anonymous" defacing a government website to protest a specific policy.
 - DDoS attacks on a company's website to protest its environmental record.

4. Intellectual Challenge and Notoriety:

- **Analysis:** For some highly skilled individuals, the primary motivation is the intellectual challenge of breaking into a secure system. The desire for recognition and respect within the hacker community ("fame") can be a powerful driver.
- **Examples:** A solo hacker breaches a well-known tech company's network simply to prove it can be done and to earn bragging rights.

5. **Revenge and Disgruntlement:**

- **Analysis:** Current or former employees with privileged access and grievances may launch attacks as an act of revenge. Their insider knowledge makes them particularly dangerous.
- **Examples:** A system administrator who is about to be fired plants a logic bomb to delete critical company data after their departure.

6. **Systemic Vulnerabilities and Low Risk:**

- **Analysis:** The widespread use of poorly secured software and systems, combined with the global and anonymous nature of the internet, creates a low-risk, high-reward environment for criminals. The perceived difficulty of being identified, apprehended, and prosecuted encourages criminal activity.

30. What are major security threats to Information Security & measures for controlling them? (10 Marks)

Information security faces a constantly evolving landscape of threats. Protecting assets requires understanding these threats and implementing corresponding controls.

Major Security Threats and Control Measures:

Threat	Description	Control Measures
1. Malware	Malicious software designed to harm or disable computers. Includes viruses, worms, Trojans, ransomware, and spyware.	Technical: Use anti-virus/anti-malware software, EDR solutions, application whitelisting. Administrative: Enforce policies prohibiting installation of unauthorized software.
2. Phishing & Social Engineering	Tricking individuals into revealing sensitive information (passwords, financial data) through deceptive emails, websites, or calls.	Administrative: Conduct regular security awareness training and simulated phishing tests. Technical: Implement email filtering solutions and DMARC to block spoofed emails.
3. Denial-of-Service (DoS/DDoS) Attacks	Flooding systems with excessive traffic to make them unavailable to legitimate users.	Technical: Use DDoS mitigation services, traffic filtering, load balancing. Operational: Maintain an incident response plan for outage situations.
4. Insider Threats	Harmful or negligent actions by employees, contractors, or partners with internal access.	Administrative: Apply least privilege, conduct background checks, ensure strong offboarding processes. Technical: Use UEBA tools to detect abnormal behavior.
5. Advanced Persistent Threats (APTs)	Long-term, targeted attacks where intruders stay hidden to steal data.	Technical: Use IDS, network segmentation, threat intelligence tools. Administrative: Implement a Zero-Trust security model.
6. Zero-Day Exploits	Attacks exploiting unknown vulnerabilities with no available patch.	Technical: Use heuristic-based IPS and application control. Operational: Maintain rapid patch management once updates become available.
7. Data Breach	Unauthorized access and extraction of sensitive data.	Technical: Encrypt data at rest and in transit. Administrative: Implement strict access control & data classification policies. Physical: Secure physical access to servers/data centers.

31. Evaluate the role of Confidentiality, Integrity, and Availability (CIA) in achieving security. (10 Marks)

The CIA Triad is a fundamental, core model of information security that defines the three core objectives that all security measures are designed to achieve. It provides a comprehensive framework for developing security policies and systems.

The Role of the CIA Triad:

1. Confidentiality:

- **Role:** Ensures that information is not disclosed to unauthorized individuals, entities, or processes. It is about protecting data privacy and secrecy.
- **How it Achieves Security:** Confidentiality measures prevent data breaches and espionage. They ensure that only people with the right to see certain information can access it.
- **Security Measures:**
 - **Encryption:** Scrambles data so it is unreadable without a key.
 - **Access Control Lists (ACLs) & Authentication:** Define who is allowed to access what data and verify their identity.
 - **Network Security:** Using VPNs and firewalls to prevent eavesdropping.

2. Integrity:

- **Role:** Guards against improper information modification or destruction. It ensures that data is accurate, trustworthy, and has not been tampered with.
- **How it Achieves Security:** Integrity measures ensure the reliability of information. They are crucial for decision-making, financial transactions, and legal evidence, as they guarantee that the data has not been altered.
- **Security Measures:**
 - **Hashing:** Creates a unique digital fingerprint of a file. If the file is altered, the hash changes, revealing the tampering.
 - **Digital Signatures:** Provide authenticity and non-repudiation, proving that a message came from a specific sender and was not changed.
 - **Version Control and Logging:** Tracks changes to data to identify who made changes and when.

3. Availability:

- **Role:** Ensures that information and the systems that process it are accessible and usable upon demand by authorized users. It is about ensuring timely and reliable access to data.
- **How it Achieves Security:** Availability measures prevent disruption of business operations. They protect against threats like Denial-of-Service (DoS) attacks, hardware failures, and natural disasters that could make critical systems unusable.
- **Security Measures:**
 - **Redundancy:** Using RAID arrays for disks, backup power supplies, and redundant network paths.
 - **Disaster Recovery & Business Continuity Plans:** Procedures to restore systems and operations after an outage.
 - **DDoS Mitigation Services:** Services that filter malicious traffic to keep services online.

Evaluation: The CIA Triad is essential because it provides a balanced and holistic view of security. Focusing on only one or two aspects is insufficient. For example:

- A system with high **confidentiality** and **integrity** that is frequently down (low **availability**) is not secure, as it fails its business purpose.
- A highly **available** system with poor **confidentiality** is vulnerable to data theft. Therefore, all three principles must be balanced and implemented in tandem to achieve true information security.

32. Discuss how privacy issue can impact transborder data flows? (10 Marks)

Privacy issues have become a significant barrier and regulatory challenge to the free flow of data across national borders, known as transborder data flow. As countries enact strict data privacy laws to protect their citizens, these laws often conflict, creating legal and operational complexities for global businesses.

Impacts of Privacy Issues on Transborder Data Flows:

1. Legal and Regulatory Fragmentation (The "Balkanization" of the Internet):

- **Impact:** Different countries have adopted different data privacy regimes with conflicting requirements. The most prominent is the European Union's **General Data Protection Regulation (GDPR)**, which strictly limits the transfer of EU citizens' personal data to countries outside the EU that are not deemed to have "adequate" privacy protections.
- **Example:** A US-based company using a cloud server in India to process data from its German customers must ensure the transfer complies with GDPR, which may require complex legal mechanisms like Standard Contractual Clauses (SCCs).

2. Increased Compliance Costs and Operational Complexity:

- **Impact:** Multinational corporations must invest heavily in legal expertise, data governance frameworks, and technical controls to ensure compliance with multiple, often contradictory, privacy laws. This includes implementing data localization, conducting transfer impact assessments, and managing individual data rights.
- **Example:** A company like Google or Microsoft must build and maintain separate data centers in different regions (e.g., the EU, the US, and China) to comply with local data residency laws, significantly increasing their infrastructure costs.

3. Data Localization Mandates:

- **Impact:** Some countries, like Russia and China, have enacted data localization laws that require certain types of data (especially personal data of citizens) to be collected, processed, and stored on servers physically located within the country's borders. This directly restricts transborder data flow.
- **Example:** A foreign financial service provider operating in China must store all data related to Chinese customers on servers within China, preventing them from using their global centralized data analytics platform.

4. Impediment to Global Innovation and Research:

- **Impact:** Restrictions on data flows can hamper international collaborative research, especially in fields like medicine and science that rely on sharing large datasets across borders for analysis (e.g., genomic research). The friction and risk associated with transferring data can slow down or halt such projects.

5. Trade Tensions and Geopolitical Tool:

- **Impact:** Data privacy regulations are increasingly being used as geopolitical tools. A country's "adequacy" decision regarding another nation's privacy laws can be a point of diplomatic leverage, impacting trade relationships.
- **Example:** The EU-US Privacy Shield framework, which allowed data transfers, was invalidated by the European Court of Justice, creating uncertainty for thousands of US companies and becoming a point of contention in EU-US relations until a new framework (the EU-U.S. Data Privacy Framework) was established.

In summary, privacy concerns have transformed transborder data flow from a technical matter into a complex legal and geopolitical issue, forcing organizations to navigate a patchwork of regulations that can inhibit global operations and the free flow of information.

33. Is security an ethical responsibility? Justify with a case study. (10 Marks)

Yes, information security is not just a technical or legal requirement but a fundamental **ethical responsibility** for organizations. This responsibility extends to protecting the data of customers, employees, and partners from harm, misuse, and exploitation.

Justification: Organizations are entrusted with vast amounts of sensitive personal data. A failure to secure this data can lead to tangible harm to individuals, including financial loss, identity theft, discrimination, and psychological distress. Ethically, the entity that collects and benefits from this data has a duty of care to protect it.

Case Study: The Equifax Data Breach (2017)

Background: Equifax, one of the three major credit reporting agencies in the US, held highly sensitive personal and financial data on nearly 150 million Americans.

The Breach: Hackers exploited a known vulnerability in the Apache Struts web framework—a vulnerability for which a patch had been available for over two months—to gain access to Equifax's systems. The company's failure to apply this patch led to one of the most severe data breaches in history.

Ethical Failures and Justification for Security as an Ethical Responsibility:

1. Failure of Duty of Care (Negligence):

- Equifax had an ethical duty to protect the incredibly sensitive data it was entrusted with. Its failure to implement a basic security practice—patching known vulnerabilities—was a clear act of negligence. This was not a sophisticated, unpreventable attack; it was a failure of fundamental cyber hygiene.

2. Lack of Transparency and Accountability:

- After discovering the breach, Equifax delayed public notification and provided confusing and inadequate information to the public. This lack of transparency violated the ethical principle of informed consent and prevented individuals from taking timely steps to protect themselves from identity theft.

3. Resulting Harm to Individuals:

- The breach exposed names, Social Security numbers, birth dates, and driver's license numbers. This information is a goldmine for identity thieves, leading to:
 - **Financial Harm:** Victims faced fraudulent loans, credit card applications, and tax refund fraud filed in their names.
 - **Psychological Distress:** Victims experienced significant stress, anxiety, and a feeling of violation, knowing their most personal data was in the hands of criminals.

4. Breach of Trust:

- Consumers do not voluntarily provide data to credit agencies like Equifax; it is collected as part of the financial system. This creates an even higher ethical obligation. Equifax's failure represented a profound breach of the trust placed in it by the public and the financial ecosystem.

Conclusion: The Equifax case is a stark demonstration that security is an ethical imperative. The company's technical failure was a symptom of a deeper ethical failure in its corporate culture and priorities. It shows that when organizations treat security as a mere compliance checkbox rather than a core ethical responsibility, the consequences for individuals and society can be devastating. Therefore, protecting data is not just about avoiding fines; it is about upholding a fundamental duty to do no harm.

34. Explain the five factors contributing to the increasing vulnerability of information resources with examples. (5 Marks)

Information resources are becoming increasingly vulnerable due to a confluence of technological and human factors.

Five Contributing Factors:

1. The Widespread Interconnectivity of Systems:

- The rise of the Internet, cloud computing, and IoT has created a vastly expanded attack surface. A vulnerability in one connected device (e.g., a network printer) can be a gateway to the entire corporate network.
- *Example:* The Mirai botnet took control of millions of insecure IoT devices (like cameras and DVRs) to launch massive DDoS attacks.

2. The Rise of Sophisticated Cybercriminals:

- Cybercrime has become a highly profitable, organized business. Criminal syndicates and state-sponsored actors have vast resources and develop advanced, persistent attack methods that are difficult to defend against.
- *Example:* Ransomware-as-a-Service (RaaS) kits allow low-skilled criminals to launch sophisticated ransomware attacks by renting the malware from its developers.

3. Increased Reliance on Commercial Software with Known Vulnerabilities:

- Organizations depend on complex software (OS, applications) that inevitably contain bugs and security flaws. When vendors publish patches, delays in applying them leave systems exposed.
- *Example:* The WannaCry ransomware attack exploited a known Windows vulnerability for which a patch had been released. Organizations that had not applied the patch were devastated.

4. The Human Factor (The Weakest Link):

- Employees can unintentionally compromise security through mistakes, such as falling for phishing scams, using weak passwords, or misconfiguring cloud storage. Social engineering preys on human psychology.
- *Example:* An employee receives a phishing email disguised as a message from the IT department, clicks a link, and enters their login credentials, giving them to an attacker.

5. The Mobile and Remote Workforce:

- The shift to remote work means employees access corporate data from home networks and personal devices, which are often less secure than the corporate perimeter. This creates new points of vulnerability.
- *Example:* An employee uses an unsecured public Wi-Fi at a coffee shop to access the company's CRM system, potentially allowing a hacker on the same network to intercept their data.

35. Describe the privacy issues affected by IT. (10 Marks)

Information Technology (IT), while offering immense benefits, has created profound and complex privacy issues by enabling the unprecedented collection, storage, analysis, and sharing of personal data.

Key Privacy Issues Affected by IT:

1. Data Collection and Digital Surveillance:

- **Issue:** Websites, social media platforms, mobile apps, and IoT devices continuously collect vast amounts of personal data—often without the user's explicit, informed consent. This includes browsing history, location data, purchase habits, and even biometric data.
- **Examples:**
 - **Social Media:** Facebook tracks user activity across the web via "Like" buttons to build detailed profiles for targeted advertising.
 - **Public Surveillance:** The use of facial recognition technology by governments and private entities in public spaces creates a de facto surveillance state.

2. Data Aggregation and Profiling:

- **Issue:** IT allows organizations to combine data from multiple sources to create a comprehensive profile of an individual. This profile can reveal sensitive information (e.g., health conditions, political views, sexual orientation) that the person never intended to share.
- **Example:** A data broker combines your online shopping data, public records, and location data from your phone to infer that you are pregnant and sells this information to marketing companies.

3. Lack of Transparency and Informed Consent:

- **Issue:** Privacy policies are often long, complex, and written in legal jargon, making true "informed consent" a myth. Users click "I Agree" without understanding how their data will be used, shared, or sold.
- **Example:** A free mobile game's privacy policy may state that it shares user data with "third-party partners," but the user has no clear idea who these partners are or what they do with the data.

4. Data Security Breaches:

- **Issue:** The centralized storage of massive datasets makes them attractive targets for hackers. A single security breach can expose the personal information of millions of people to identity theft and fraud.
- **Example:** The Yahoo data breaches (2013-2014) compromised the data of all 3 billion user accounts, including names, email addresses, and hashed passwords.

5. Chilling Effects on Freedom of Expression:

- **Issue:** The knowledge that one's online activities are being monitored and recorded can lead to self-censorship. People may avoid researching controversial topics or expressing dissenting opinions for fear of being tracked or facing repercussions.
- **Example:** A citizen in an authoritarian regime may avoid searching for information about political opposition, or an employee may hesitate to criticize their employer online.

6. Challenges of Anonymization and Re-identification:

- **Issue:** Organizations often claim to "anonymize" data before using or selling it. However, advances in IT have made it easy to re-identify individuals by cross-referencing anonymized datasets with other publicly available information.
- **Example:** Researchers have successfully re-identified individuals from a dataset of "anonymized" Netflix viewing records by correlating it with public IMDB reviews.

36. Give an understanding of types of control to achieve security. (10 Marks)

To achieve a robust security posture, organizations implement a layered set of controls. These are broadly categorized into three main types: Physical, Technical, and Administrative controls. A comprehensive security program requires a balance of all three.

Types of Security Controls:

1. Physical Controls:

- These are measures designed to protect the physical infrastructure and environment of the information system.
- **Purpose:** To prevent unauthorized physical access, damage, and interference.
- **Examples:**
 - **Locks and Keycards:** Securing doors to server rooms and offices.
 - **Security Guards and CCTV:** Monitoring and surveilling physical premises.
 - **Biometric Access Systems:** Using fingerprints or retina scans for access.
 - **Fire Suppression Systems and Climate Controls:** Protecting hardware from environmental threats.

2. Technical (or Logical) Controls:

- These are the technology-based safeguards built into the hardware, software, and network components of the system.
- **Purpose:** To control access to data and systems and to protect them from cyber threats.
- **Examples:**
 - **Access Control Mechanisms:** Passwords, multi-factor authentication (MFA), and role-based access control (RBAC).
 - **Encryption:** Scrambling data at rest (on disks) and in transit (over the network).
 - **Firewalls and Intrusion Prevention Systems (IPS):** Monitoring and controlling network traffic.
 - **Antivirus and Anti-malware Software:** Detecting and removing malicious software.
 - **Audit Trails and Logs:** Recording user activity for accountability and forensic analysis.

3. Administrative (or Managerial) Controls:

- These consist of the policies, procedures, and guidelines that define the organization's security framework and govern the behavior of people.
- **Purpose:** To create the structure for how security is managed and to guide employee conduct. They are the foundation upon which physical and technical controls are built.
- **Examples:**
 - **Security Policies and Procedures:** Documents outlining acceptable use, password requirements, and data handling rules.

- **Employee Background Checks:** Screening hires for sensitive positions.
- **Security Awareness and Training:** Educating employees on how to recognize and avoid security threats like phishing.
- **Business Continuity and Disaster Recovery Plans:** Ensuring the organization can recover from a security incident.
- **Risk Assessments and Vulnerability Management:** Proactively identifying and mitigating security risks.

Functional Classification: These three types can also be viewed by their function:

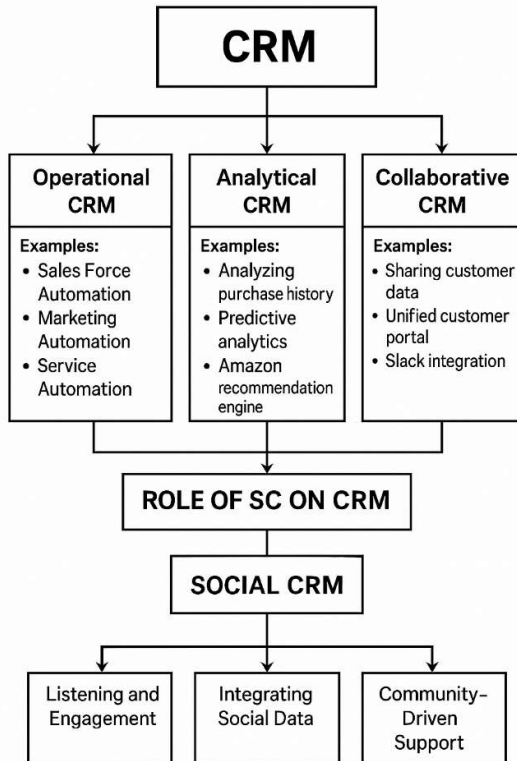
- **Preventive Controls:** Designed to stop a security incident from occurring (e.g., firewalls, access control, security training).
- **Detective Controls:** Designed to identify and alert on a security incident that is in progress or has occurred (e.g., IDS, CCTV, log monitoring).
- **Corrective Controls:** Designed to limit the damage after an incident and restore systems (e.g., backups, incident response plans, patches).

A layered defense, using a combination of Physical, Technical, and Administrative controls, is essential for effective information security.

Module 4 – Social Computing

37. Explain CRM & describe types of CRM with examples & relate role of SC on CRM. (10 Marks)

Customer Relationship Management (CRM) is a technology for managing all your company's relationships and interactions with current and potential customers. The goal is simple: improve business relationships to grow your business. A CRM system helps companies stay connected to customers, streamline processes, and improve profitability.



Types of CRM:

1. Operational CRM:

- **Focus:** Automating and improving customer-facing processes, primarily in sales, marketing, and customer service.
- **Examples:**
 - **Sales Force Automation (SFA):** Tools that automate sales tasks like tracking leads, contacts, and opportunities. *Example: **Salesforce** automates the entire sales pipeline from lead to closed deal.*
 - **Marketing Automation:** Software that automates marketing campaigns across multiple channels (email, social media). *Example: **HubSpot** automatically sends a series of welcome emails to new subscribers.*
 - **Service Automation:** Systems that manage customer service requests through helpdesks and call centers. *Example: **Zendesk** routes customer support tickets to the right agent.*

2. Analytical CRM:

- **Focus:** Analyzing customer data to gain insights into customer behavior, value, and trends. It involves data mining and business intelligence.
- **Examples:**
 - Analyzing purchase history to identify the most profitable customer segments.
 - Using predictive analytics to forecast future buying behaviors and identify customers at risk of churning.
 - *Example: **Amazon** uses analytical CRM to power its recommendation engine ("Customers who bought this also bought...").*

3. Collaborative CRM:

- **Focus:** streamlining communication and collaboration between different departments (sales, marketing, service) and with the customer to improve the overall customer experience.
- **Examples:**
 - A system that shares customer interaction data from the call center with the sales team, so the salesperson knows about a recent service issue before calling the client.
 - Providing customers with a unified portal to interact with the company across different channels.
 - *Example: **Slack** or **Microsoft Teams** integrated with a CRM so that teams can collaboratively discuss a client's account in real-time.*

The Role of Social Computing (SC) on CRM (Social CRM):

Social Computing (SC) has transformed traditional CRM into **Social CRM**. It involves leveraging social media platforms and technologies to engage with customers, listen to their conversations, and integrate this social data into the CRM strategy.

- **Listening and Engagement:** Companies use SC to monitor brand mentions, industry conversations, and customer feedback on platforms like Twitter, Facebook, and Instagram. This allows for proactive customer service and engagement.
 - *Example: A customer tweets a complaint about a product, and the company's social care team immediately responds publicly to resolve the issue, demonstrating excellent service.*
- **Integrating Social Data:** Social CRM integrates social profile data and interactions into the traditional customer record in the operational CRM. A salesperson can see a lead's LinkedIn profile or a service agent can see a customer's recent tweets about their company.
- **Community-Driven Support:** Companies use SC to create online brand communities where customers can help each other, reducing the burden on formal support channels and building a sense of belonging.
 - *Example: **Adobe's support forums** where users help each other solve problems, moderated by Adobe experts.*

38. Analyze how social computing is inspiring customer service. (5 Marks)

Social computing has fundamentally reshaped customer service by shifting it from a private, reactive process to a public, proactive, and collaborative experience.

Key Impacts on Customer Service:

1. **Proactive and Public Service:** Customers now voice complaints and praise publicly on social media (Twitter, Facebook). This forces companies to be proactive in monitoring these channels and resolving issues publicly, which enhances brand transparency and reputation.
2. **Increased Speed and Expectation:** Platforms like Twitter have created an expectation of instant response. Companies have developed dedicated "social care" teams to provide real-time support, significantly reducing resolution times compared to traditional email or phone support.
3. **Peer-to-Peer Support and Communities:** Social computing enables the creation of online user communities where customers can help each other solve problems. This crowdsourced support reduces the load on company agents and fosters a sense of brand loyalty and community.
4. **Rich Source of Customer Insight:** Social media is a vast, real-time focus group. By analyzing customer conversations, complaints, and suggestions, companies can identify common issues, improve products, and tailor their services more effectively.

39. Write notes on E-commerce. (10 Marks)

E-commerce, short for electronic commerce, is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. It encompasses a wide range of business models and has revolutionized the global economy.

Key Aspects of E-commerce:

1. Major Business Models:

- **Business-to-Consumer (B2C):** Transactions between businesses and individual consumers. This is the most common model.
 - *Example: Amazon.com, Netflix.*
- **Business-to-Business (B2B):** Transactions between businesses, such as a manufacturer selling to a wholesaler.
 - *Example: Alibaba.com, ThomasNet.*
- **Consumer-to-Consumer (C2C):** Transactions between consumers, facilitated by a third-party platform.
 - *Example: eBay, Facebook Marketplace.*
- **Consumer-to-Business (C2B):** Individuals selling products or services to businesses.
 - *Example: A freelance designer selling a logo to a company on Upwork, or an influencer being paid for a post.*

2. Key Enabling Technologies:

- **E-commerce Platforms:** Software solutions like Shopify, Magento, and WooCommerce that allow businesses to set up online stores.
- **Secure Payment Gateways:** Services like PayPal, Stripe, and Square that process online payments securely.
- **Mobile Commerce (M-commerce):** The subset of e-commerce conducted via mobile devices like smartphones and tablets.
- **Digital Marketing:** SEO, SEM, email marketing, and social media marketing are crucial for driving traffic to e-commerce sites.

3. Benefits of E-commerce:

- **For Businesses:** Global reach, 24/7 availability, lower operational costs, personalized marketing, and access to rich customer data.
- **For Consumers:** Convenience, greater product selection, competitive pricing, access to reviews, and easy price comparisons.

4. Challenges of E-commerce:

- **Security Concerns:** Risk of data breaches, credit card fraud, and phishing attacks.
- **Lack of Physical Interaction:** Customers cannot touch or try products before buying, leading to higher return rates.
- **Logistics and Supply Chain:** Managing inventory, shipping, and returns efficiently can be complex and costly.
- **Intense Competition:** The low barrier to entry leads to intense price competition and the need for strong differentiation.

E-commerce continues to evolve with trends like social commerce (shopping directly on social media platforms), voice commerce, and augmented reality (AR) for virtual product try-ons.

40. Compare between mobile applications like WhatsApp and Telegram on various Parameters. (5 Marks)

Parameter	WhatsApp	Telegram
Multimedia Sharing	Supports images, videos, documents, and voice messages. File size limit is ~2GB.	Supports images, videos, documents, voice messages with a file size limit of 2GB, making it better for large files.
Security & Privacy	End-to-end encryption (E2EE) by default for all chats and calls.	E2EE only for “Secret Chats.” Regular cloud chats are encrypted client-to-server but not E2EE.
Storage	Messages & media stored on the user’s device. Backups to Google Drive/iCloud are not E2EE.	Cloud-based storage; chats & files stored on Telegram servers and accessible from any device.
Data Usage	Automatically compresses images/videos to reduce data usage.	Users have more control: can enable/disable auto-download and select media types.
Notifications	Standard, customizable chat and group notifications.	Advanced notification settings, per-chat exceptions, quiet hours, and granular control.

41. Write note on M-commerce. What are new challenges that it has introduced in business. (10 Marks)

M-commerce (Mobile Commerce) is the buying and selling of goods and services through wireless handheld devices such as smartphones and tablets. It is a subset of e-commerce that leverages mobile-optimized websites and dedicated mobile apps to facilitate transactions.

Key Characteristics of M-commerce:

- **Ubiquity:** Services are available anywhere, anytime.
- **Convenience:** The ease of shopping from a personal device.
- **Location-Based Services:** Uses GPS to offer personalized, location-specific deals and information (e.g., store finders, targeted promotions).
- **App-Centric Economy:** Driven by dedicated shopping apps that offer a smoother user experience than mobile browsers.

New Challenges Introduced by M-commerce:

1. Security and Privacy Concerns:

- **Challenge:** Mobile devices are more susceptible to loss, theft, and malware. In-app payment systems and stored credentials are prime targets for hackers. Apps often request extensive permissions, accessing sensitive data like location and contacts.
- *Example:* A malicious app on a user's phone stealing saved credit card information from a shopping app.

2. User Experience (UX) and Design Complexity:

- **Challenge:** Creating a seamless, intuitive, and fast shopping experience on a small screen is difficult. Complex navigation, slow loading times, or a cumbersome checkout process on a mobile app can lead to abandoned carts.
- *Example:* A checkout form that is too long and difficult to fill out on a phone screen causes a customer to abandon their purchase.

3. Platform and Device Fragmentation:

- **Challenge:** Businesses must ensure their m-commerce apps and websites function flawlessly across a vast array of devices (iOS, Android), screen sizes, and operating system versions. This increases development, testing, and maintenance costs.

4. Integration with Legacy Systems:

- **Challenge:** Integrating real-time m-commerce platforms (e.g., for inventory, pricing, loyalty points) with a company's existing backend ERP and inventory systems can be complex and expensive, leading to discrepancies.

5. Increased Competition and "Showrooming":

- **Challenge:** M-commerce makes it incredibly easy for consumers to compare prices while in a physical store ("showrooming"). A customer might look at a product in a store but buy it from a cheaper online competitor on their phone right there, eroding brick-and-mortar sales.

6. Payment Gateway and Transaction Fees:

- **Challenge:** Managing different mobile payment systems (Apple Pay, Google Pay, Samsung Pay) and their associated fees adds a layer of complexity to the financial operations of a business.

42. How is E-commerce supported by MIS? Give one case to describe same. (5 Marks)

A Management Information System (MIS) supports e-commerce by integrating data from all online and related operations to provide comprehensive reports and insights that drive strategic decision-making, optimize operations, and enhance customer experience.

Case Description: Amazon's Recommendation System

- **The MIS Support:** Amazon's world-famous "Customers who bought this also bought..." feature is a prime example of an MIS (specifically, a Decision Support System) supporting e-commerce.
- **How it Works:**
 1. The system's **Transaction Processing System (TPS)** component captures every click, view, search, and purchase in real-time.
 2. This massive volume of data is stored and processed in a **data warehouse**.
 3. **Analytical software** (using collaborative filtering and machine learning algorithms) analyzes this data to identify patterns and relationships between products and customer behaviors.
 4. The MIS then generates and delivers a *personalized output*—the list of recommended products—directly to the user's screen.
- **Impact:** This MIS-driven feature directly supports e-commerce by increasing the **Average Order Value (AOV)** and enhancing customer satisfaction through personalized discovery, which is a key competitive advantage for Amazon.

43. Write notes on E-Business. (10 Marks)

E-Business (Electronic Business) is a broader term than e-commerce. It refers to the use of digital technologies and the internet to conduct *all* business processes, not just buying and selling. While e-commerce focuses on financial transactions, e-business encompasses the entire value chain, including internal processes, customer service, and collaboration with partners.

Key Dimensions of E-Business:

1. Internal Business Processes (Intrabusiness):

- Using internet technologies to manage internal operations.
- *Examples:*
 - **Intranets** for sharing company information and policies.
 - **Enterprise Resource Planning (ERP)** systems to integrate departments like finance, HR, and manufacturing.
 - **Collaboration Tools** like Slack and Microsoft Teams for internal communication.

2. Business-to-Consumer (B2C) / E-Commerce:

- The online selling of products and services to individual consumers.
- *Examples: Amazon.com, Netflix.*

3. Business-to-Business (B2B):

- The electronic exchange of products, services, or information between businesses.
- *Examples:*
 - A manufacturer ordering raw materials from a supplier through an electronic portal.
 - **Alibaba.com** connecting wholesalers with retailers.

4. Consumer-to-Consumer (C2C):

- Electronic transactions between consumers, facilitated by a third-party platform.
- *Examples: eBay, Etsy.*

5. Business-to-Employee (B2E):

- The use of intranets and portals to provide services and information to employees, such as online training, benefits management, and payroll services.

6. Collaborative Commerce (C-Commerce):

- The use of digital technologies to enable multiple businesses to collaboratively design, develop, manage, and research products, services, and innovative business processes across organizational boundaries.
- *Example:* A car manufacturer and its parts suppliers using a shared online platform to collaborate on the design of a new vehicle in real-time.

E-Business vs. E-Commerce:

- **E-Commerce** is a subset of e-business, dealing specifically with the *buying and selling* of goods and services.
- **E-Business** is the *digital transformation of the entire business model*, including both front-end (customer-facing) and back-end (internal and partner-facing) processes.

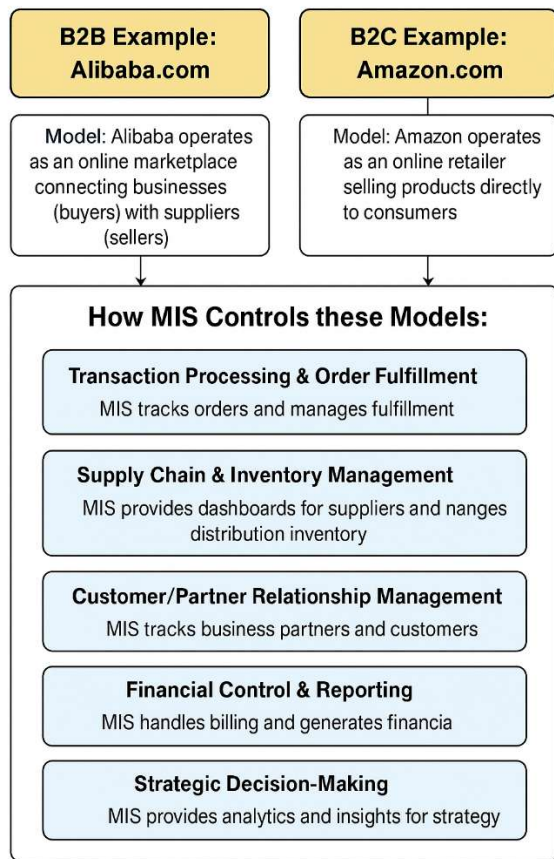
44. Give examples of B2B and B2C business models and explain how MIS controls them. (10 Marks)

B2B (Business-to-Business) Example: Alibaba.com

- **Model:** Alibaba operates as an online marketplace that connects manufacturers and wholesalers (sellers) with other businesses (buyers). It facilitates bulk transactions.

B2C (Business-to-Consumer) Example: Amazon.com

- **Model:** Amazon operates as an online retailer that sells products directly to individual consumers. It also acts as a marketplace for third-party sellers.



How MIS Controls these Models:

The MIS provides the data backbone and control mechanisms for both models, ensuring efficiency, profitability, and strategic alignment.

Control Function	How MIS Controls B2B (Alibaba)	How MIS Controls B2C (Amazon)
Transaction Processing & Order Fulfillment	The TPS records high-volume bulk orders, tracks supplier inventory, and automates purchase order generation for business buyers.	The TPS processes millions of individual customer orders, updates inventory in real time, and triggers fulfillment and shipping workflows.
Supply Chain & Inventory Management	MIS provides suppliers dashboards for demand forecasting, inventory turnover, and production planning. Helps buyers track order status and delivery timelines.	MIS uses predictive analytics to auto-reorder popular items, manage inventory at distribution centers, and ensure fast delivery (e.g., Amazon Prime).
Customer/Partner Relationship Management (CRM)	MIS functions as a partner management system, tracking negotiations, contract terms, and key performance metrics (e.g., delivery reliability) for each business partner.	MIS acts as a traditional CRM, tracking individual customer behavior, purchase history, browsing data, and support interactions to personalize marketing.
Financial Control & Reporting	MIS generates invoices for bulk orders, manages complex payment terms (e.g., net-60), and produces profitability reports for supplier relationships and buyer segments.	MIS handles individual payment processing, manages refunds/returns, and generates daily sales reports showing revenue by category, product, and region.
Strategic Decision-Making	Analytical MIS helps identify trending B2B categories, optimize commission rates, and design new services for business users.	MIS insights drive Amazon's decisions on product development (e.g., Amazon Basics), pricing strategies, and market expansion opportunities.

In both cases, the MIS is the central nervous system that collects data from every interaction, processes it, and provides the controls and insights necessary to manage, optimize, and grow the business.

45. Describe the benefits of Social Commerce to customers. (10 Marks)

Social Commerce is the use of social media platforms and online communities to facilitate the buying and selling of products and services. It integrates e-commerce directly into the social media experience, offering significant benefits to customers.

Benefits of Social Commerce to Customers:

1. Discovery and Inspiration:

- Customers discover new products organically through posts from brands they follow, influencer recommendations, and content shared by their friends. This transforms shopping from a task-driven search into an inspired discovery process.
- *Example:* Seeing a friend post a photo wearing a new dress from a brand on Instagram, and being able to click a "Shop Now" tag to purchase it immediately.

2. Convenience and Frictionless Shopping:

- Social commerce reduces the steps between seeing a product and buying it. Features like "in-app checkout" mean customers don't have to leave their social media app to complete a purchase, creating a seamless and convenient experience.
- *Example:* Using Facebook Shops to browse a catalog and make a purchase without ever leaving the Facebook app.

3. Social Proof and Trusted Recommendations:

- Before making a purchase, customers can see reviews, ratings, and user-generated content (like photos and videos) from other buyers within the social platform. This "social proof" is often more trusted than traditional advertising.
- *Example:* Reading the comments on a product post on Facebook to see what other customers are saying about its quality and fit.

4. Personalized and Targeted Shopping Experience:

- Social media algorithms are highly effective at showing users products that align with their interests, based on their likes, follows, and online behavior. This creates a highly personalized shopping feed.
- *Example:* Pinterest's "Recommended for You" section suggests products and ideas based on a user's previous pins and searches.

5. Direct Engagement with Brands:

- Social commerce allows customers to interact directly with brands—asking questions, getting styling advice, or resolving issues via direct message or comments—creating a more personal and engaging relationship than traditional e-commerce.
- *Example:* Sending a direct message to a brand on Instagram to ask about a product's material before buying.

6. Access to Exclusive Deals and Flash Sales:

- Brands often use their social media channels to offer exclusive discounts, promo codes, and early access to sales to their followers, rewarding them for their engagement.
- *Example:* A beauty brand announcing a 24-hour flash sale exclusively on its Twitter feed.

46. What is the need of Social Computing for businesses? (10 Marks)

Social Computing is no longer an optional marketing channel but a business imperative. It is essential for modern businesses to survive and thrive in a connected world where customers are empowered and conversations are public.

The Need for Social Computing in Business:

1. Customer Engagement and Relationship Building:

- Social platforms provide a direct line to customers for building relationships, fostering brand loyalty, and creating a community around the brand. It humanizes the business and moves beyond transactional interactions.

2. Brand Management and Reputation Monitoring:

- Conversations about a brand happen with or without its participation. Social computing allows businesses to actively monitor their brand reputation, address negative sentiment quickly, and amplify positive feedback.

3. Cost-Effective Marketing and Advertising:

- Social media offers highly targeted advertising options that are often more cost-effective than traditional media. Businesses can reach specific demographics, interests, and behaviors with precision.

4. Customer Insight and Market Research:

- Social media is a vast, real-time source of unsolicited customer feedback and market intelligence. By listening to conversations, businesses can understand customer needs, identify trends, and gather feedback on products faster and more cheaply than through traditional surveys.

5. Enhanced Customer Support (Social Care):

- Customers expect to get support through the channels they use most. Providing timely customer service on social media (social care) resolves issues publicly, demonstrating commitment to customer satisfaction and reducing the load on call centers.

6. Driving Traffic and Sales (Social Commerce):

- As discussed in the previous question, social computing directly drives sales through social commerce features, turning social platforms into direct revenue channels.

7. Recruitment and Talent Acquisition:

- Companies use platforms like LinkedIn to recruit talent and use other social media to showcase their company culture, making them more attractive to potential employees.

In summary, the need for social computing stems from its power to connect businesses with their customers, protect and build their brand, gain actionable insights, and ultimately drive growth in a digital-first economy. Ignoring it means ceding control of the conversation and missing critical opportunities.

47. Briefly describe the risks of social computing to business giving suitable examples. (10 Marks)

While social computing offers immense benefits, it also introduces significant risks that businesses must manage proactively to protect their reputation, security, and legal standing.

Risks of Social Computing to Business:

1. Reputation Damage and Viral Backlash:

- **Risk:** A single misguided post, a customer service failure, or an employee's offensive comment can go viral within hours, causing severe and lasting damage to the brand's reputation.
- **Example:** A restaurant receiving a scathing public review from a food blogger, which is then shared thousands of times, leading to a sharp decline in customers.

2. Security Breaches and Phishing Attacks:

- **Risk:** Social media platforms are used by cybercriminals to launch phishing attacks, spread malware, or gather intelligence for a targeted attack on a company (e.g., through social engineering).
- **Example:** An employee receives a fake LinkedIn connection request from a "recruiter" that leads to a malicious website designed to steal their corporate login credentials.

3. Data Privacy and Compliance Violations:

- **Risk:** Mishandling customer data collected through social media or failing to comply with data protection regulations (like GDPR or CCPA) can lead to massive fines and legal action.
- **Example:** A company running a contest on Facebook that improperly shares entrant data with third parties without explicit consent, violating privacy laws.

4. Employee Misconduct and Policy Challenges:

- **Risk:** Employees' personal social media activity can reflect poorly on the company. Without a clear social media policy, businesses risk leaks of confidential information, harassment issues, or other misconduct playing out in public.
- **Example:** An employee posting negative comments about their boss or a forthcoming product launch on their public Twitter account.

5. Intellectual Property Leakage:

- **Risk:** Employees or even the marketing team might inadvertently leak proprietary information, trade secrets, or unreleased product details while posting on social media.
- **Example:** An engineer posting a photo from the lab that accidentally reveals a prototype of a new device in the background.

6. Productivity Loss:

- **Risk:** Unmonitored use of social media in the workplace can lead to significant distractions and a loss of employee productivity.
- **Example:** Employees spending excessive work hours browsing Facebook or Instagram instead of focusing on their tasks.

7. Impersonation and Fake Accounts:

- **Risk:** Malicious actors can create fake profiles impersonating a brand or its executives to scam customers, spread misinformation, or damage the brand's credibility.
- **Example:** A fake customer service account on Twitter that directs customers to a fraudulent website to "resolve" their issues, leading to financial theft.

48. Are Blogs and Wikis different? Justify with application of each. (5 Marks)

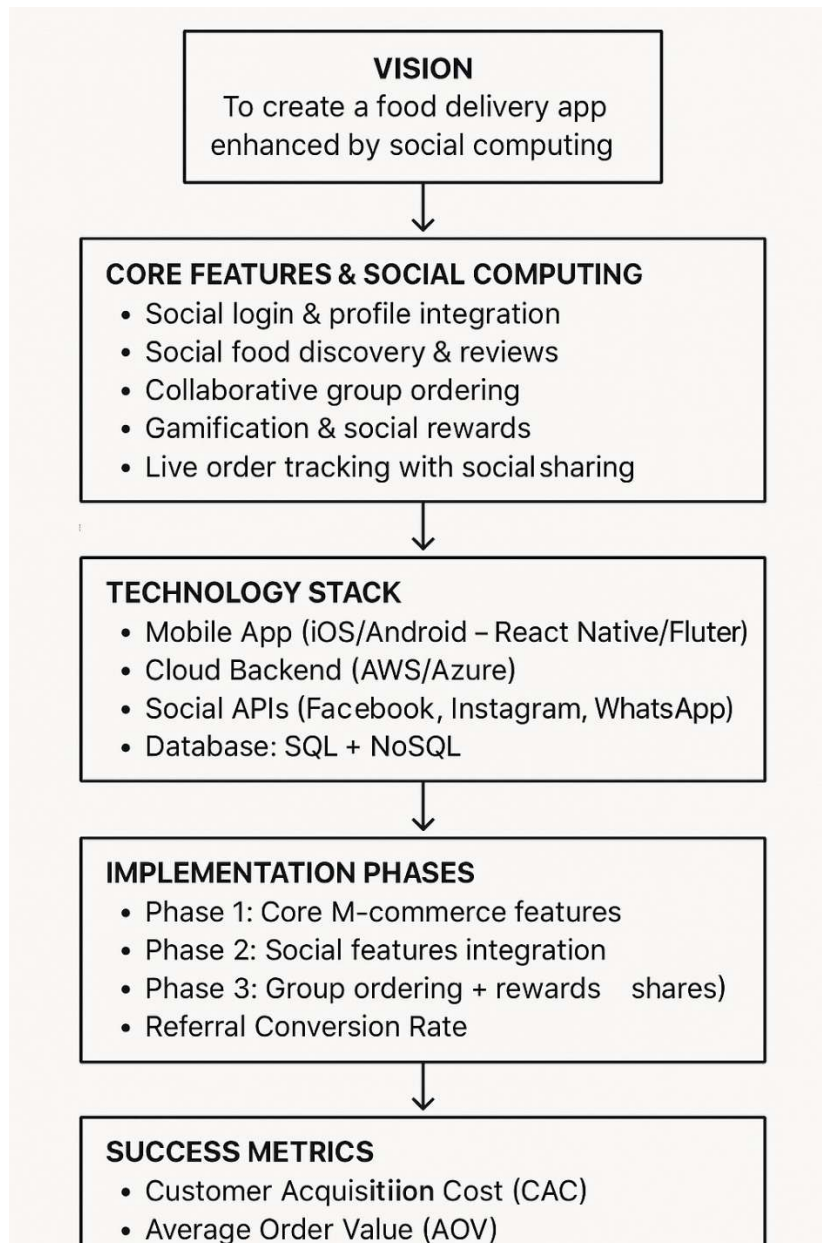
Yes, blogs and wikis are fundamentally different in their purpose, structure, and primary application. The key difference is that a **blog is primarily a publishing tool** (one-to-many), while a **wiki is primarily a collaboration tool** (many-to-many).

Justification:

Feature	Blog	Wiki
Purpose & Nature	A chronological or reverse-chronological series of posts, usually written by one or a few authors. Used to share opinions, news, updates, or expertise.	A collection of interlinked pages that multiple users can edit collaboratively. Used to build and maintain a shared knowledge base.
Primary Application	Marketing & Thought Leadership: Companies use blogs to attract audiences by sharing industry insights, product announcements, and educational articles.	Internal Knowledge Management: Organizations use wikis (e.g., Confluence) for documenting processes, project notes, FAQs, and company policies.
Example	Moz Blog: Publishes SEO-related articles to educate users and strengthen brand authority.	Wikipedia: A global encyclopedia collaboratively edited by volunteers.

49. Develop the plan for delivery application in M-commerce using social computing. (10 Marks)

Project Plan: "QuickBite" - A Socially-Integrated Food Delivery M-Commerce App



1. Vision: To create a food delivery app that leverages social computing to enhance discovery, sharing, and group ordering, making food ordering a more social and engaging experience.

2. Core Features & Social Computing Integration:

- **Feature 1: Social Login and Profile Integration.**
 - **Plan:** Allow users to sign up/login using their existing social media accounts (Facebook, Google). Import basic profile details and friend lists to kickstart the social graph within app.
- **Feature 2: Social Food Discovery & Reviews.**
 - **Plan:**
 - **In-App Social Feed:** A feed showing what restaurants and dishes their friends have ordered
 - **Integrated Reviews:** Enable users to post photos and reviews of their orders directly to the app. Allow them to easily share these reviews to their own social media (Instagram, Facebook) with a pre-populated hashtag (#QuickBiteEats).

- **Social Computing Element:** User-Generated Content (UGC), Social Proof.
- **Feature 3: Collaborative Group Ordering.**
 - **Plan:** A feature that allows one user to start a group order and share a unique link via in-app messaging or directly to WhatsApp/Telegram. Friends can join the order, select their own items, and pay individually. The order is placed and delivered as one.
 - **Social Computing Element:** Collaborative Commerce, Peer-to-Peer Coordination.
- **Feature 4: Gamification and Social Rewards.**
 - **Plan:** Implement a rewards system where users earn points for writing reviews, sharing orders, and referring friends. Create leaderboards among friend groups. Offer badges for milestones.
 - **Social Computing Element:** Gamification, Social Influence.
- **Feature 5: Live Order Tracking with Social Sharing.**
 - **Plan:** Allow users to share their live order tracking map with friends or on social media, creating buzz and implicit endorsements.

3. Technology Stack:

- **Frontend:** Native mobile apps (iOS/Android) using React Native/Flutter.
- **Backend:** Cloud-based (AWS/Azure) for scalability.
- **Social Integration:** APIs from Facebook, Instagram, and WhatsApp.
- **Database:** A combination of SQL (for transactional data) and NoSQL (for social feed data).

4. Implementation Phases:

- **Phase 1 (Months 1-4):** Develop core M-commerce functionality - restaurant listings, menu, cart, payment gateway, and basic order tracking.
- **Phase 2 (Months 5-7):** Integrate social features Social Login, Social Feed, & Reviews.
- **Phase 3 (Months 8-10):** Develop and launch advanced collaborative features - Group Ordering

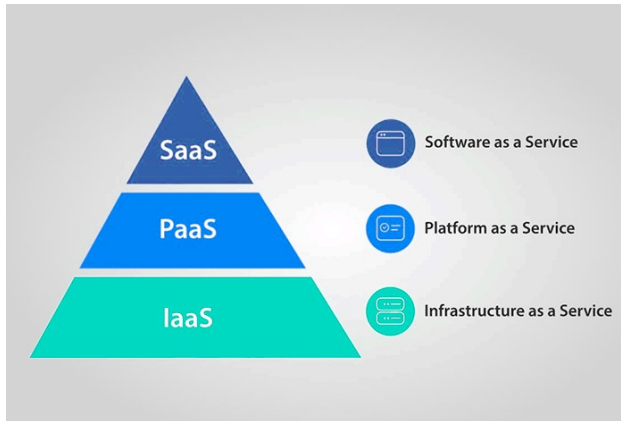
5. Success Metrics:

- **Customer Acquisition Cost (CAC)** through social referrals.
- **Average Order Value (AOV)** for group orders vs. individual orders.
- **User Engagement** metrics (time in app, review frequency, social shares).

Module 5 – Computer Networks & Cloud Computing

50. Describe various Cloud Computing models and highlight their evolution. (10 Marks)

Cloud computing delivers computing services—servers, storage, databases, networking, software, analytics, intelligence over the Internet to offer faster innovation, flexible resources, and economies of scale. Its models have evolved to offer varying levels of control & management.



Cloud Computing Service Models (The Evolution of Responsibility):

Model	Description	Analogy	Evolution & Key Differentiator
1. Infrastructure as a Service (IaaS)	Provides fundamental computing resources such as virtual machines, storage, networks, and operating systems over the internet.	Renting a plot of land — you get the land (infrastructure), and you build everything else yourself.	The most basic cloud layer. Users manage everything from the OS upward. Offers maximum flexibility but requires more management.
2. Platform as a Service (PaaS)	Offers an environment for developing, testing, deploying, and managing applications.	Renting a fully serviced apartment — the building, plumbing, and utilities are handled; you only bring your application (furniture).	Evolved from IaaS. Provider manages OS, runtime, middleware, leaving developers to focus solely on application development.
3. Software as a Service (SaaS)	Delivers ready-to-use software applications over the internet on a subscription model.	Staying in a hotel — you use the room (software) without handling maintenance or setup.	The most evolved and user-friendly model. Provider manages everything; users simply use the software. Most common for end users.

Evolution Highlight: The evolution from IaaS -> PaaS -> SaaS represents a progressive **abstraction of IT management responsibilities**.

- Starting with **IaaS**, businesses managed everything but the physical hardware.
- **PaaS** emerged to free developers from managing the runtime environment.
- **SaaS** completed this by delivering a finished product, requiring no technical management from the user.

51. Analyze the key benefits of cloud computing. (10 Marks)

Cloud computing offers transformative benefits that have made it the default model for IT infrastructure for organizations of all sizes. These benefits are primarily centered around cost, agility, and scalability.

Key Benefits of Cloud Computing:

1. Cost Efficiency (Reduced Capital Expenditure - CapEx):

- **Analysis:** Cloud computing follows a **pay-as-you-go** model, eliminating the massive upfront capital expenditure of purchasing and maintaining physical servers and data centers. Companies convert this into a predictable operational expenditure (OpEx), paying only for the computing resources they actually consume.

2. Scalability and Elasticity:

- **Analysis:** This is one of the most powerful benefits. Cloud resources can be scaled up or down instantly in response to changes in demand. An e-commerce site can automatically handle a surge in traffic during a holiday sale and then scale back down afterward, ensuring performance while optimizing costs.

3. Speed and Agility:

- **Analysis:** Vast amounts of computing resources can be provisioned in minutes, often with just a few clicks. This gives businesses a lot of flexibility and reduces the time to market for new applications and services from weeks to minutes.

4. Global Reach and Accessibility:

- **Analysis:** Cloud providers have a global network of data centers. This allows a business to deploy its applications in regions around the world with minimal latency, providing a better experience for international customers. Services can be accessed from anywhere with an internet connection.

5. Enhanced Reliability and Disaster Recovery:

- **Analysis:** Cloud providers offer data backup, disaster recovery, and business continuity solutions at a fraction of the cost of building them on-premises. Data is mirrored across multiple redundant sites on the provider's network, making it more resilient against failures.

6. Focus on Core Business:

- **Analysis:** By offloading the burden of managing IT infrastructure (racking, stacking, powering, and cooling servers), companies can redirect their valuable IT talent and resources towards activities that differentiate their business and drive innovation.

7. Increased Collaboration:

- **Analysis:** Cloud-based workflows and shared storage allow teams to collaborate more easily and effectively from any location. Documents and projects can be accessed and worked on simultaneously by multiple users, as seen with tools like Google Workspace and Microsoft 365.

52. Define topology and its types with advantages and disadvantages. (5 Marks)

Network Topology refers to the physical or logical arrangement of nodes (e.g., computers, printers) and connections in a network. It defines how devices are interconnected and how data flows between them.

Common Types of Topologies:

1. Bus Topology:

- **Description:** All devices are connected to a single central cable (the bus).
- **Advantages:** Simple to install and cost-effective for small networks.
- **Disadvantages:** A break in the main cable brings down the entire network. Performance degrades with heavy traffic.

2. Star Topology:

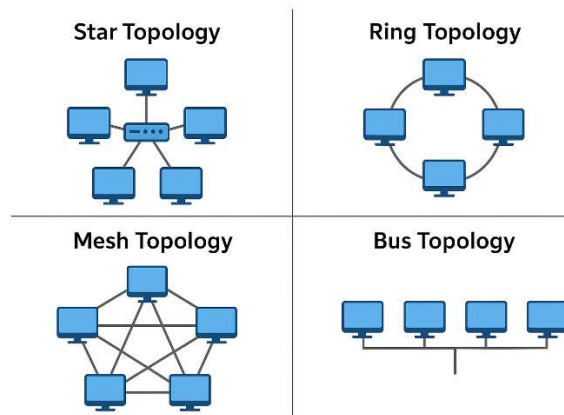
- **Description:** All devices are connected to a central hub or switch.
- **Advantages:** Easy to install and manage. Failure of one cable only affects one device.
- **Disadvantages:** Failure of the central hub/switch brings down the entire network. Requires more cable than a bus topology.

3. Ring Topology:

- **Description:** Each device is connected to two other devices, forming a circular data path.
- **Advantages:** Data travels in one direction, reducing packet collisions. orderly network.
- **Disadvantages:** A single node failure can break the loop and disrupt the entire network. Adding or removing devices is difficult.

4. Mesh Topology:

- **Description:** Every device is directly connected to every other device in the network.
- **Advantages:** Extremely reliable and fault-tolerant. Provides multiple paths for data.
- **Disadvantages:** Very expensive and complex to install and manage due to the high number of connections.



53. List the main differences between wireless and wired technologies. (5 Marks)

Parameter	Wired Technology (e.g., Ethernet)	Wireless Technology (e.g., Wi-Fi)
Medium	Uses physical cables (copper, fiber optic).	Uses radio waves/microwaves.
Mobility	Very limited; device must stay physically connected.	High mobility within the wireless coverage area.
Installation & Cost	Installation is difficult and often expensive, especially in older buildings.	Installation is easier and cheaper with minimal physical infrastructure.
Reliability & Speed	Highly reliable with higher speeds and low latency.	More prone to interference; generally lower speeds and higher latency than wired.
Security	More secure because physical cable access is required.	Less secure; wireless signals can be intercepted, requiring strong encryption (WPA3, etc.).

54. Explain applications of computer networks. (5 Marks)

Computer networks enable resource sharing and communication, forming the backbone of modern IT.

Key Applications:

1. **Resource Sharing:** Allows multiple users to share hardware (e.g., a network printer, scanner) and software applications, reducing costs.
2. **Communication:** Enables fast and efficient communication via email, instant messaging, and video conferencing.
3. **Data Sharing and Centralized Storage:** Provides authorized users with access to centralized data and files on shared servers or in the cloud.
4. **Internet Access:** A network (LAN) connects all devices within an organization to the internet through a shared gateway.
5. **E-commerce:** The entire ecosystem of online shopping, banking, and trading is built on vast, global computer networks.

55. What do you mean by CAAS, SAAS, and TAAS? Give the application of each. (5 Marks)

These are specialized "as-a-Service" models within cloud computing.

- **CaaS (Communications as a Service):**
 - **Meaning:** Delivers enterprise-level communications solutions (voice over IP, video conferencing, instant messaging) over the internet.
 - **Application:** **Zoom** or **Microsoft Teams** provides video conferencing as a service, eliminating the need for a company to host its own PBX system.
- **SaaS (Software as a Service):**
 - **Meaning:** Delivers software applications over the internet on a subscription basis.
 - **Application:** **Salesforce** provides CRM software as a service, accessible via a web browser without any installation.
- **TaaS (Telemetry as a Service):**
 - **Meaning:** Provides a platform for collecting, transmitting, and analyzing data from remote sensors and IoT devices.
 - **Application:** A smart city project uses a TaaS platform to collect and analyze data from traffic sensors to optimize signal timings and reduce congestion.

Module 6 – Information Systems within Organizations & SDLC

56. Describe the tools that augment the traditional SDLC. (5 Marks)

The traditional, linear Waterfall SDLC can be slow. Modern tools augment it to increase speed, collaboration, and quality.

Augmenting Tools:

1. **Project Management & Collaboration Tools (e.g., Jira, Trello, Asana):** Manage tasks, track bugs, and facilitate team communication, adding agility to the planning and monitoring phases.
2. **Version Control Systems (e.g., Git, SVN):** Manage changes to source code, allowing multiple developers to work simultaneously without conflict. This is crucial for the development phase.
3. **Continuous Integration/Continuous Deployment (CI/CD) Tools (e.g., Jenkins, GitLab CI):** Automate the process of testing and deploying code, bridging the gap between development, testing, and deployment phases.
4. **Prototyping Tools (e.g., Figma, Adobe XD):** Allow for the creation of interactive mockups of the software early in the design phase, enabling faster user feedback and reducing rework later.

57. List down the types of support provided by Accounting IS, Finance IS, Production/Operations Management (POM) IS, Marketing IS, and Human Resources IS. (10 Marks)

These are Functional Area Information Systems (FAIS) that support specific departments.

Functional Area IS	Types of Support Provided
Accounting IS	• General ledger, accounts payable/receivable • Payroll processing • Financial reporting and statements (Balance Sheet, P&L) • Billing and invoicing
Finance IS	• Managing cash and investments • Portfolio management • Capital budgeting and forecasting • Risk analysis and credit management
Production / Operations Management (POM) IS	• Production scheduling and planning • Inventory control and management • Quality control and monitoring • Supply chain management and logistics
Marketing IS	• Lead generation and management • Campaign management and ROI analysis • Customer segmentation and targeting • Sales forecasting and performance tracking
Human Resources IS (HRIS)	• Employee records management (payroll, benefits, attendance) • Recruitment and applicant tracking • Performance management and appraisal • Training and development tracking

58. Categorize the approach to managing information across an entire organization. (5 Marks)

Managing information across an entire organization requires a structured approach. The primary approaches can be categorized as follows:

1. Decentralized Approach:

- Each department or business unit manages its own information systems and data independently.
- **Pros:** High flexibility and responsiveness to departmental needs.
- **Cons:** Creates data silos, leads to inconsistency, and hinders a unified organizational view.

2. Centralized Approach:

- A central IT department manages all information systems and data for the entire organization.
- **Pros:** Ensures standardization, reduces redundancy, and provides better control and security.
- **Cons:** Can be slow to respond to specific departmental needs and may create bottlenecks.

3. Federated Approach (Hybrid):

- A balanced approach where a central IT sets overall standards, policies, and architecture, while individual departments have the autonomy to manage their own systems within that framework.
- This is the most common and effective model for large organizations, as it balances enterprise-wide control with departmental flexibility.

59. What are the features of Executive Support System (ESS)? (5 Marks)

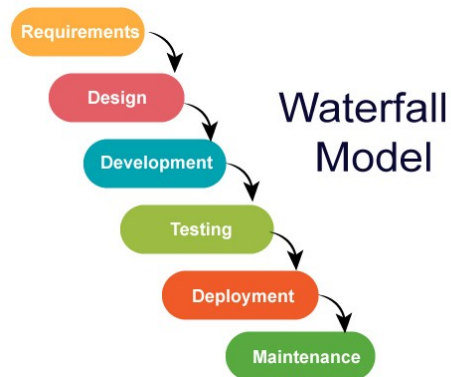
An Executive Support System (ESS) is designed to support the unstructured, long-term, strategic decision-making needs of senior management.

Key Features:

1. **Top-Level Overview:** Provides a broad, aggregated view of the entire organization's performance.
2. **User-Friendly Interface:** Features easy-to-use interfaces, often with **digital dashboards** and drill-down capabilities.
3. **Access to Internal and External Data:** Integrates data from internal MIS and DSS with external data (e.g., market trends, competitor news, economic indices).
4. **Exception Reporting:** Highlights data that falls outside pre-defined thresholds, allowing executives to focus on critical issues.
5. **"What-If" Analysis:** Allows executives to model the potential impact of strategic decisions.

60. Explain the phases of the System Development Life Cycle with examples. (10 Marks)

The System Development Life Cycle (SDLC) is a structured, phased process for planning, creating, testing, and deploying an information system.



Phases of the SDLC with Examples:

1. Planning and Feasibility:

- **Objective:** Define the problem, scope, and objectives of the new system. Conduct a feasibility study (technical, economic, operational).
- **Example:** A bank identifies that its loan approval process is too slow. The planning phase determines if a new Loan Approval System is feasible and outlines its high-level goals and budget.

2. Systems Analysis:

- **Objective:** Gather and analyze detailed requirements from end-users. Understand the current system's workflows and data flows.
- **Example:** Analysts interview loan officers, applicants, and underwriters to document every step of the current manual process and list the requirements for the new system (e.g., credit score integration, automated document checks).

3. Systems Design:

- **Objective:** Create the technical blueprints for the system. This includes designing the user interface, databases, and system architecture.
- **Example:** Designers create mockups of the loan application screens, design the database tables for customer and loan data, and specify how the system will integrate with an external credit bureau API.

4. Implementation (Development):

- **Objective:** The actual building (coding) of the system based on the design specifications.
- **Example:** Programmers write the code for the loan application, build the database, and integrate the credit score API.

5. Integration and Testing:

- **Objective:** Test the system to ensure it is free of bugs, meets all requirements, and works as intended. This includes unit, integration, system, and user acceptance testing (UAT).
- **Example:** The bank's IT team and a group of loan officers test the new system with sample data to find and fix errors before it goes live.

6. Deployment:

- **Objective:** Install the finished system in the actual production environment for users to operate.
- **Example:** The new Loan Approval System is launched across all bank branches. Data from the old system is migrated, and users are trained.

7. Maintenance and Support:

- **Objective:** Fix any issues that arise post-deployment and make enhancements to the system over its lifetime.
- **Example:** A bug is found where a specific document type isn't uploading correctly. Development team releases a patch to fix it. Later new feature is added to calculate eligibility for a new loan product.

61. Write short notes on (1) TPS (2) ERP (10 Marks)

(1) Transaction Processing System (TPS) A Transaction Processing System (TPS) is an information system that collects, stores, modifies, and retrieves the daily transactions of an organization. It is the most fundamental operational-level system and serves as the primary data source for other systems like MIS and DSS.

- **Function:** Processes high-volume, routine transactions (e.g., sales orders, hotel reservations, payroll, stock updates).
- **Key Characteristics:** Ensures **ACID properties** (Atomicity, Consistency, Isolation, Durability) to guarantee reliable transaction processing.
- **Importance:** It is the backbone of an organization's operations. Without a TPS, basic business activities would grind to a halt. For example, a supermarket cannot function without its Point-of-Sale (POS) TPS to record sales and update inventory.

(2) Enterprise Resource Planning (ERP) System An Enterprise Resource Planning (ERP) system is an integrated suite of business applications that allows an organization to manage and automate its core business processes in a unified system. It uses a single, centralized database to share data across various departments.

- **Function:** Integrates key functions like finance, HR, supply chain, manufacturing, and sales into one coherent system.
- **Key Characteristics:** **Integration** is its defining feature. It provides a "single version of the truth," breaking down information silos.
- **Importance:** ERP systems improve efficiency, provide real-time data for decision-making, and standardize processes across the entire enterprise. For example, when a sales order is entered, the ERP system automatically updates inventory, schedules production, and creates an invoice in the finance module.

62. Identify advantages and drawbacks of businesses implementing an ERP system. (10 Marks)

Implementing an ERP system is a major strategic decision with significant benefits and challenges.

Advantages of ERP:

1. **Integrated Information and Process Efficiency:** ERP breaks down departmental silos by integrating data into a single system. This streamlines workflows, eliminates data redundancy, and improves cross-departmental coordination.
2. **Improved Decision-Making:** Provides real-time, accurate data across the entire organization, enabling managers to make better, faster, and more informed decisions.
3. **Enhanced Reporting and Standardization:** Standardizes business processes and reporting, making it easier to generate consolidated reports and comply with regulatory standards.
4. **Reduced Operational Costs:** Improves inventory management, optimizes procurement, and streamlines human resources, leading to significant cost savings over time.
5. **Improved Customer Service:** Provides customer service representatives with a 360-degree view of the customer, including order history and interactions, leading to better and faster service.

Drawbacks of ERP:

1. **High Initial Cost and Complexity:** ERP systems are extremely expensive to license, implement, and customize. The total cost of ownership is very high.
 2. **Lengthy and Difficult Implementation:** Implementation can take years and is a complex process that often requires significant changes to business processes, causing major organizational disruption.
 3. **Resistance to Change:** Employees are often resistant to adopting the new, standardized processes mandated by the ERP system, leading to a drop in productivity during the transition.
 4. **Vendor Dependence:** Companies can become heavily dependent on a single vendor (e.g., SAP, Oracle) for support, updates, and training, which can be costly and limit flexibility.
 5. **Potential for Implementation Failure:** If not managed correctly, ERP implementations can fail to meet their objectives, leading to massive financial losses and operational chaos.
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63. Explain what do you mean by Office Automation System. (10 Marks)

An Office Automation System (OAS) is a network of computer hardware and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks and goals. Its primary purpose is to increase the productivity of data workers (e.g., secretaries, administrative assistants, clerks) and managers by streamlining routine office operations.

Key Components and Functions of an OAS:

1. **Word Processing:**
 - Software used to create, edit, format, and print documents.
 - *Examples: Microsoft Word, Google Docs.*
2. **Spreadsheets:**
 - Software used for numerical data analysis, calculation, and visualization.
 - *Examples: Microsoft Excel, Google Sheets.*
3. **Electronic Mail (Email):**
 - A system for sending and receiving messages and files electronically.
 - *Examples: Microsoft Outlook, Gmail.*
4. **Desktop Publishing (DTP):**
 - Software that combines word processing with graphic design to produce high-quality publications like newsletters and brochures.
 - *Examples: Adobe InDesign, Microsoft Publisher.*
5. **Document Management Systems:**
 - Systems for storing, tracking, and managing electronic documents.
 - *Examples: SharePoint, Google Drive, Dropbox.*

6. Communication and Collaboration Tools:

- Tools that facilitate real-time communication and teamwork.
- *Examples: Video Conferencing (Zoom), Instant Messaging (Slack, Teams).*

7. Electronic Scheduling:

- Digital calendars for scheduling appointments, meetings, and resources.
- *Examples: Google Calendar, Microsoft Outlook Calendar.*

Impact of OAS: OAS has fundamentally transformed the modern office by:

- Replacing paper-based processes with digital ones.
- Dramatically increasing the speed and accuracy of communication.
- Enabling more effective collaboration among employees, regardless of their physical location.
- Reducing the time and cost associated with administrative tasks.

64. Give an overview of System Development. (5 Marks)

System Development is the process of defining, designing, testing, and implementing a new software application or program. It is a structured, multi-step process that transforms a business need or opportunity into a functional information system.

Overview of the Process: It begins with **Planning** to identify the scope and feasibility of the project. This is followed by **Analysis**, where detailed user requirements are gathered. Next, in the **Design** phase, technical specifications and blueprints are created. The system is then built or **Implemented** through coding. Rigorous **Testing** is conducted to ensure quality and functionality. Finally, the system is **Deployed** for users, and ongoing **Maintenance** is performed to fix issues and make improvements. This lifecycle ensures the final system is reliable, meets user needs, and delivers value to the organization.

