INFORMATION TECHNOLOGY

FAST TRACK NOTES for NOV- 2015

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CLICK ON CHAPTER NAMES TO DIRECT VISIT

1.Business Process Management & IT Business Process Management & IT

2.Information Systems and IT Fundamentals

3.Telecommunications and Networks

4.Business Information System

5.Business Process Automation through Application Software

1. BUSINESS PROCESS MANAGEMENT & IT

PART A- FAST TRACK NOTES

Write short notes on Business Process Management (BPM)?

a) BPM is defined as the achievement of an organization's objectives through the improvement, management and control of essential business processes.

b) It is iterative management of business processes over complete life cycle.

c) It enables enterprises to assess the usefulness and optimum cost of business processes.

d) It requires enterprise to improve processes and establish measurements used to track and monitor performance for continuous improvement.

e) Process management provides a sequence of analytical tools that are essential to the modern project manager, analyst and management consultant.

f) BPM has evolved from the concepts such as Business Process Re-engineering, Six Sigma, Total Quality Management (TQM) and process supporting technologies.

Write about Principles and Practices of BPM?

The primary objective of BPM is to improve products and services.

Principles:

a) Processes are assets that create value for customers.

b) A managed process produces consistent value to customers.

c) Continuous improvement of processes.

Practices:

a) Attempt for process-oriented organizational structure

b) Appoint process owners

c) Senior management needs to commit and handle BPM

d) Process improvements should take a bottom-up approach

e) Use of information technology systems to monitor, control, analyze, and improve processes

f) Work collaboratively with business partners.

g) Continuously train the personnel.

h) Utilize both incremental (e.g., Six Sigma) and more radical (e.g., BPR) to process improvement

Explain typical life cycle of an accounting transaction? (Or) Explain Book keeping life cycle in Business Process?

» It covers the business processes involved in recording and processing accounting events of a company.

» It begins when a transaction or financial event occurs and ends with its inclusion in the financial statements.

Life cycle of an accounting transaction:

a) **Source Document:** Document the capture data from transactions.

b) **Journal**: Transactions are recorded into journals from the source document.
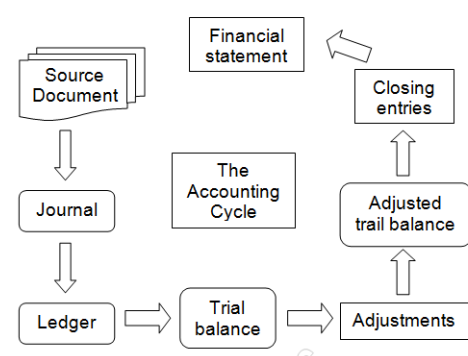
c) **Ledger**: Entries are posted to the ledger from the journal.

d) **Trial Balance**: Unadjusted trial balance containing totals from all account heads is prepared.

e) **Adjustments**: Appropriate adjustment entries are passed.

f) **Adjusted Trial balance**: Trial balance is finalized post adjustments.

g) **Closing entries**: Appropriate entries are passed to transfer accounts to financial statements.

h) **Financial statement**: The accounts are organized into the financial statements.

Write about the lifecycle of a sales transaction (or) Explain the life cycle of Order to Cash (OTC or O2C)?

» It covers all the business processes relating to fulfilling customer requests for goods or services.

» It involves transactional flow of data from the initial point of documenting a customer order to the final point of collecting the cash.

Life cycle of a sales transaction:

» **Customer Order:** A purchase order received from a customer specifying the type, quantity and agreed prices.

» **Recording:** availability of the items is checked and customer order is booked.

» **Pick release:** the items are moved from the warehouse to the staging area.

» **Shipping**: items are loaded onto the carrier for transport to the customer.

» **Invoice:** invoice of the transaction is generated and sent to the customer.

» **Receipt:** money is received from the customer against the invoices.

» **Reconciliation:** the bank reconciliation of all the receipts is performed.
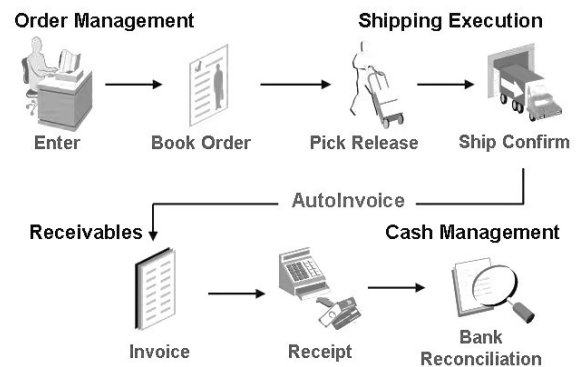
Explain the lifecycles of a purchase transaction?(or)Explain Procure to pay (purchase to pay or P2P) life cycle?

» It covers all the business processes relating to obtaining raw materials required for production of a product or for providing a service.

» It involves the transactional flow of data from the point of placing an order to the point of payment to the vendor.

Life cycles of a purchase transaction:

a) **Purchase requisition:** a document is prepared requesting the purchase department to place an order with the quantity and time frame.

b) **Request for quote:** an invitation is sent to the vendors to join a bidding process for specific products.

c) **Quotation:** the vendors provide cost quotations for the supply of products.
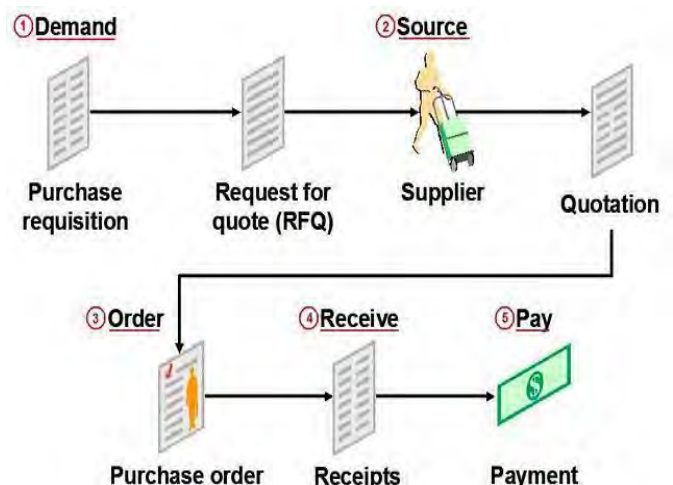
d) **Purchase order:** a commercial document is issued to the vendor specifying the type, quantity and agreed prices.

e) **Receipts:** the physical receipt of goods and invoices.

f) **Payments:** the payments are made against the invoices.


Wrtie about six sigma model.

a) Six Sigma employs quality management and statistical analysis of process outputs by identifying and removing the causes of defects and minimizing variability in manufacturing and business processes.

b) Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified value targets.

c) For example: reduce process cycle time, reduce pollution, reduce costs, increase customer satisfaction, and increase profits.
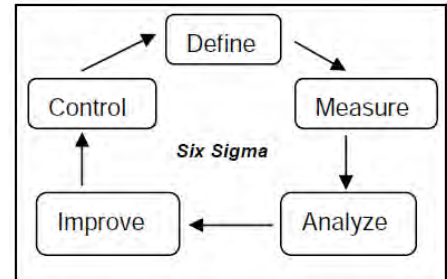
d) It follows a life-cycle having following phases:

» **Define:** Customers are identified and their requirements are gathered. Measurements that are critical to customer satisfaction [Critical to Quality, (CTQ)] are identified for further project improvement.

» **Measure:** Process output measures that are attributes of CTQs are determined.

» **Analyze:** Using statistical methods and graphical displays, possible causes of process output variations are identified.

» **Improve:** Solution alternatives are generated to fix the root cause. The most appropriate solution is identified using solution prioritization matrix and validated using pilot testing.

» **Control:** Process is standardized and documented.

Wrtie about BPM Life Cycle [BPM – L]

a) Business Process Management-Life cycle establishes a sustainable process management capability that empowers organizations to embrace and manage process changes successfully.

b) It incorporates both human resources and technology and infrastructure.

c) It follows a life-cycle having following phases:
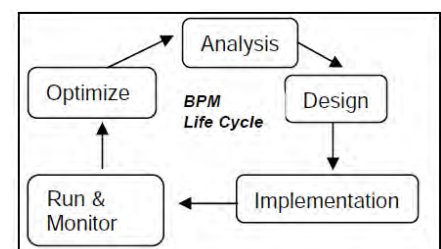
» **Analysis phase:** This involves analysis of the current environment and current processes, identification of needs and definition of requirements.

» **Design phase:** This involves evaluation of potential solutions to meet the identified needs, business process designing and business process modeling.

» **Implementation phase:** This involves project preparation, blue printing, realization, final preparation, go live and support.

» **Run and Monitor phase:** This involves business process execution or deployment and business process monitoring.

» **Optimize:** Iterate for continuous improvement.

Explain Classification of Business Processes?

1. Business processes are <u>classified</u> into <u>Organizational and operational business Processes</u>

2. <u>Different levels</u> can be identified in <u>business process management.</u> They are

   a) **Business strategy:** At the highest level, the strategy of the <u>company is specified</u>, which describes its <u>long term concepts</u>. An example of a business strategy is <u>cost leadership</u> for products in a certain domain.

   b) **Goals:** At this level, the business strategy is <u>broken down</u> to operational <u>goals</u>. Each goal can be divided into a <u>set of sub-goals</u>.

   c) **Organizational business processes:** These are <u>high-level processes</u> that are specified in <u>textual form</u> by their inputs, outputs, expected results and dependencies on other organizational <u>business processes</u>.

   d) **Operational Business Processes:** These are the <u>basis</u> for developing <u>implemented business processes</u>.

   e) **Implemented business processes:** As the business process may cover <u>different people</u> working indifferent departments, it also consider <u>allocating issues</u> such as process owners, process managers, and the method of measuring the effectiveness and efficiency of a <u>business process</u>.
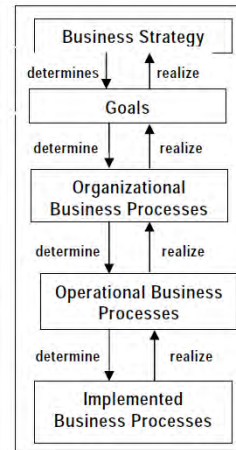
Levels of Business Process Management

## Describe the Key factors to consider in implementing BPM?

Factors	Key Considerations
Scope	A single process, Department, Entire company.
Goals	Process understanding, improvement, automation, re- engineering, optimization.
Methods to be used	Six Sigma, BPM Life Cycle Method, TQM, Informal methods.
Skills Required	Consultants, Train Employees, Formal Certification, Basic Education, Existing Skill sets.
Tools to be used	White-Boards, Sticky Notes, Software For Mapping. Documenting, Software for Simulation, Comprehensive BPMS.
Investments to Make	Training, Tools, Time.
Sponsorship/Buy-in Needed	Executive Level, Department Level, Process Owner Level, Employee Level.

Explain the Need for a BPM implementation?

a) Create the <u>long-term future positioning.</u>

b) <u>Enhance future capability</u> of the business

c) Create <u>short-term cost effectiveness.</u>

d) Improvement to <u>current customer service</u>;

e) Initiate continuous improvement.

f) Introduce a knowledge of product and customer profitability;

g) Re-engineer the business completely

h) Introduce leadership and a role for managers and empowered staff.

Explain about BPM automation?

a) The consumer is often confronted with poor customer service due to broken processes, inefficient processes and manual processes.

b) The same consumer is becoming more and more demanding with respect to delivery time – where customers used to expect and accept days or weeks for delivery, same time, the consumer is demanding higher quality of the products or services.

c) Finally, the product or service is becoming more and more personalized supported by increased customer services.
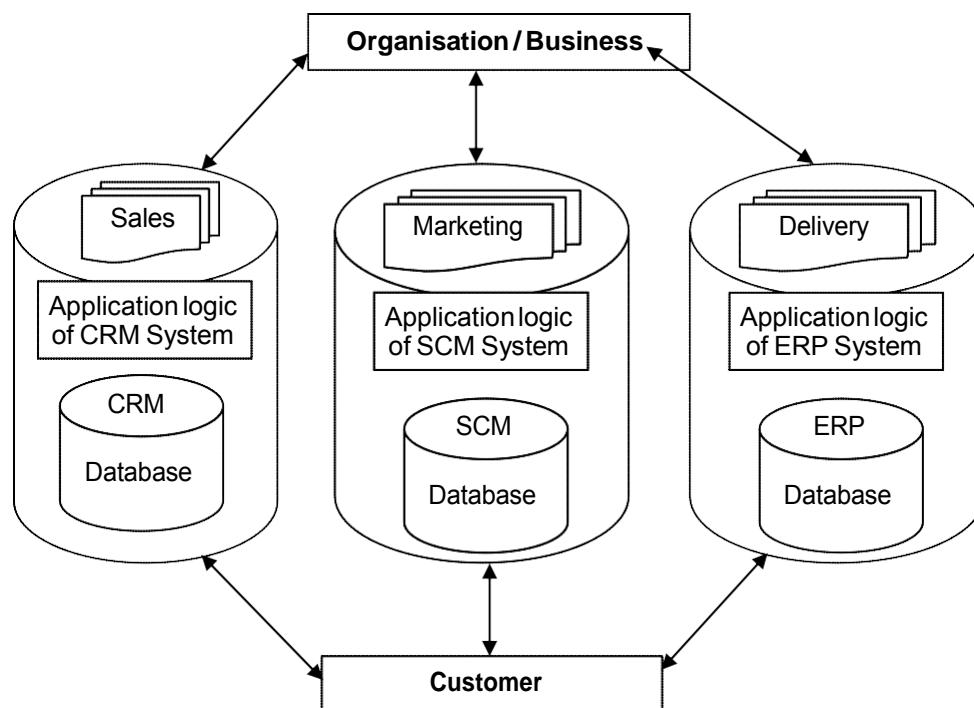
Write about BPM Technology?

a) BPM provides an independent process layer, linking the various independent applications needed to execute a single end-to-end business process.

b) BPM technology can manage the flow of activities along different applications, and the people involved and also reduce execution time.

c) By tracking the business process, an organization can monitor its performance and at the same time audit for compliance.

d) Analyzing information helps to improve the business processes further.

e) Organizations which are successful in exploiting BPM technology start by solving a specific business problem with a clear, short-term return on investment (ROI).

f) Anybody selling BPM, both internal and external to an organization, should consider both parts of the equation:

BPM = process and organization (including people) as well as technology

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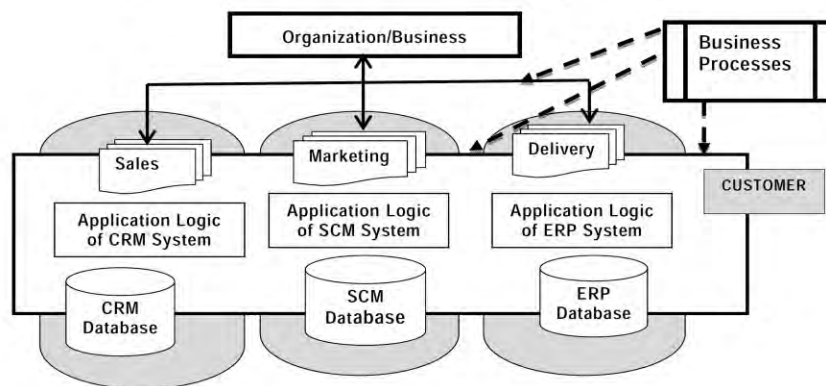
What is Value Chain Automation? List out Six business functions of the value chain?

a) It refers to separate activities which are necessary to strengthen an organization's strategies and are linked together both inside and outside the organization.

b) The idea of the Value Chain is based on the process view of organization.

c) It is made up of subsystems with inputs, transformation processes and outputs.

d) Value chain of a manufacturing organization comprises of Primary and Supportive activities.

e) Value Chain Analysis is a useful tool for working out how we can create the greatest possible value for customers.

Six business functions:

» Research and development

» Design of products, services, or processes

» Production

» Marketing and sales

» Distribution

» Customer service

Describe the Benefits & Risks of Business Process Automation (BPA)?

a) BPA is a strategy to automate business processes so as to bring benefit to enterprise in terms of cost, time and effort.

b) The core objective of BPA is achieved through integrating various business processes.

Benefits:

» **Saving on costs:** Automation leads to saving in time and labour costs.

» **Staying ahead in competition:** Businesses need to adopt automation to survive

» **Fast service to customers**: Automation helps to serve customers faster and better.

Risks:

» **Risk to jobs:** Automation may leads to posing a threat to jobs.

» **False sense of security:** Automating poor processes will not gain better business practices.

What is meant by Accounting Information System (AIS)? Explain the Basic Functions of an Accounting Information System (AIS)?

Accounting Systems Automation (AIS):

a) AIS is defined as a system of collection, storage and processing of financial and accounting data that is used by decision makers.

b) It is used for tracking accounting activity in combination with information technology resources.

c) The resulting statistical reports can be used internally or externally.

Basic Functions of an Accounting Information System (AIS):

a) AIS is the mechanism that allows accountants to perform accounting functions.

b) Automation of AIS, accountants and auditors need to be actively involved in design and implementation of the software or systems.

Basic functions of AIS:

a) **Collect and store data**:

   » Collect and store data about organization's business activities and transactions by capturing transaction data from source documents and posting data from journals to ledgers.

   » Control over data collection is improved by pre-numbering each source document.

b) **Record transaction:**

   » Record transactions data into journals.

   » These present a chronological record of what occurred and provide management with information useful for decision making.

   » These documents are in the form of reports like financial statements, managerial reports, etc.

c) **Safeguarding organizational assets:**

   » Provide adequate controls to ensure that data are recorded and processed accurately by safeguarding organizational assets (data and systems).

   » The two important methods for accomplishing this objective are providing adequate documentation of all business activities and an effective segregation of duties.

Explain Processing Cycles of an Accounts BPM?

The processing cycles of an Accounts BPM are:

1. **Financing Cycles:** The cycle consists of a set of transactions leading to the recognition of a major economic event on the financial statements.

2. **Revenue Cycle:** It includes transactions surrounding the recognition of revenue involving accounts like Sales, Accounts Receivable, Inventory and General Ledger. It involves:

Source Document	Function
Sales Order	Record Customer Order
Delivery Ticket	Record Delivery to Customer
Remittance Advice	Receive Cash
Deposit Slip	Record Amounts Deposited
Credit Memo	Support Adjustments to Customer Accounts

3. **Expenditure Cycle:** It includes transactions surrounding the recognition of expenditures involving accounts like Purchases, Accounts Payable, Cash Disbursements, Inventory and General Ledger. It also includes:

Source Document	Function
Purchase Requisition	Request that purchasing department order goods.
Purchase Order	Request goods from vendors.
Receiving Report	Record receipt of merchandise.
Check	Pay for items.

4. **Human Resource Cycle:** It describes the stages of an employee's time with the organization.

Source Document	Function
W4forms	Collect employee with holding data.
Timecards	Record time worked by employees.
Job time tickets	Record time spent on specific jobs.

5. **General Ledger & Reporting System:** It Describe the information processing operations required to update the general ledger and to produce other reports for internal and external users.

General Ledger and Reporting	
Journal voucher	Record entry posted to general ledger

6. **Data Processing Cycle:**

    a) In this cycle, the processes of business activities about which data must be collected and processed are identified.

    b) The activities, resources affected by that event, the agents who participate in that event and the event of Interest could be the input, output, processing, storage, alerts, controls and feedback.

    c) The data files stored in the system typically includes:

        »   Transaction file which is a collection of transaction input data - normally temporary in nature.

        »   Master file which is a collection of data that are of a more permanent or continuing interest.

        »   Reference (table) file contains data that are necessary to support data processing.

Explain the Impact of IT on BPM?(or) Explain about BPM Systems or suites (BPMS)?

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a) These are a new class of software that allows enterprises to devise process centric IT solutions.

b) 'Process-centric' means BPM solutions are able to integrate people, systems and data.

c) Organizations that utilize BPM systems to accomplish IT enabled business process change, gain from the following capabilities:

    »   Closer business involvement in designing IT enabled business processes,

    »   Ability to integrate people and systems that participate in business processes,

    »   Ability to simulate business processes to design the most optimal processes for implementation,

    »   Ability to monitor, control, and improve business processes in real time.

    »   Ability to effect change on existing business processes in real time without an elaborate process conversion effort.
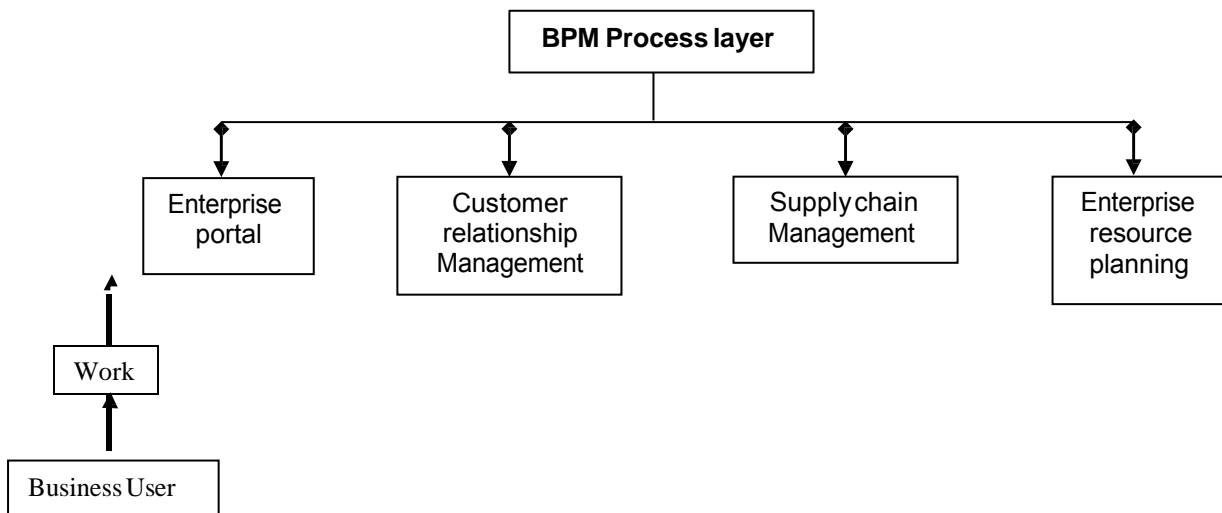
List out the Benefits of BPMS (or) Benefits of IT on BPM?

BPMS can deliver endless benefits to any sized organization. Some of them are:

a) **Automating repetitive business processes:**

» Report creation and distribution or monitoring on company's Key Performance Indicators (KPI) reduces the manual operational costs.

» It also helps the employees to concentrate on activities that are important to the success of business.

b) **BPMS works by 'loosely coupling' with a company's existing applications:**

» It allows monitoring, extracting, formatting and distributing information to systems and people in line with business events or rules.

c) **Operational Savings:**

» The processes that are repetitive are optimized and lead to reduced expenses which translate to immediate cost savings.

d) **Reduction in the administration involved in Compliance and ISO Activities:**

» The BPM is ideally suited to help support companies in their quest for process improvement and compliance/governance certification.

e) **Freeing-up of employee time:**

» In a business, for each additional hour it takes to complete a manual business process, there is a hard cost associated with employee time as well as soft costs associated with losing business or lowered productivity.

Write short notes on Business Risks of failure of IT.

a) Superficial or deficient executive involvement.

b) Deficient project management.

c) Breakdown in gap analysis.

d) Limited options for customization.

e) <u>Not flexible</u> enough to be customized to meet the specific workflow and business process.

f) <u>Failure to identify</u> future business needs

g) Inadequate assessment of the need for <u>change management</u>

h) <u>Persistent compatibility</u> problems with the diverse legacy systems of the partners.

i) Resources <u>not available</u> when <u>desirable</u>

j) <u>Software fails</u> to meet business needs

k) System may be <u>over-engineered</u> compared to the <u>actual requirements</u>.

l) Technological <u>obsolescence.</u>

Define Business Process Reengineering (BPR)? Explain with suitable example

a) It is defined as the <u>fundamental rethinking</u> and <u>radical redesign</u> of processes to <u>achieve dramatic improvement</u>, in critical, contemporary measures of performance such as <u>cost, quality, service and speed</u>.

b) It also known as <u>Business Process Redesign</u>, <u>Business Transformation,</u> or <u>Business Process Change Management</u>.

c) It involves <u>changes in structures</u> and in processes within the business environment.

d) <u>Information Technology</u> plays a <u>major role</u> in BPR as it provides <u>office automation</u> which allows the <u>business to be conducted</u> in different locations.

e) It provides <u>flexibility</u> in manufacturing, permits quicker delivery to customers and supports rapid and <u>paperless transactions</u>.

f) It allows an efficient and effective change in the manner in which work is performed.

<u>An example of BPR application:</u>

a) If a bank customer enters into the bank determined to apply for a loan, apply for an ATM card and open a savings account, most probably he must visit <u>three different desks</u> in order to be <u>serviced</u>.

b) <u>When BPR is applied</u> to an organization, the <u>customer communicates</u> with only one person, called "<u>case manager",</u> for all <u>three inquiries</u>.

c) <u>Under BPR</u>, while the loan application team processes the <u>loan application</u>, the case manager "<u>triggers</u>" the account team to open a <u>savings account</u> and the <u>ATM team</u> to supply the customer with an <u>ATM card</u>.

d) The customer <u>leaves the bank</u> having a response for his loan application, a new savings account and an ATM card, and all these without having to move around the desks for <u>signatures and documents</u>.

e) All the <u>customer's requests</u> were satisfied at the <u>same time</u> in parallel motion.

Discuss the Success factors of BPR?

Some key factors for BPR projects to succeed are:

1. **<u>Organization wide commitment:</u>**

   a) **<u>Changes to business processes</u>** would have a direct impaction processes, organizational structures, work culture, information flows, infrastructure & technologies and job competencies.

   b) This requires <u>strong leadership</u>, support and sponsorship from the <u>top management</u>.

2. **BPR team composition:**

a) A BPR team is formed which would be responsible to take the BPR project forward and make key decisions and recommendations.

b) The BPR team would include active representatives from top management, business process owners, technical experts and users.

3. **Business needs analysis:**

a) Exactly identify what current processes need reengineering which determines goals for BPR.

b) A series of sessions are held with the process owners and stakeholders and all the ideas would be evaluated to outline and conceptualize the desired business process called BPR project plan.

4. **Effective change management:** It considers the current culture to foster a change in the prevailing beliefs, attitudes and behaviors effectively.
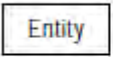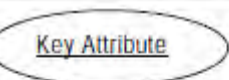
5. **Ongoing continuous improvement:** BPR is an ongoing process; hence innovation and continuous improvement are key to the successful implementation of BPR.

Explain different Approaches to Mapping Systems? (Or) what are the techniques for mapping business processes?

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a) Process mapping is a visual description of the flow of activities in a process.

b) It describes the sequence of activities that make up a process, from its starting point to its end point.

c) A picture, or chart, of the system is a concise, complete, easy-to-understand way to analyze a process or system.

d) Some of the popular pictorial representation or techniques are:

- » Entity Relationship Diagrams
- » Data Flow Diagrams
- » Systems Flow diagrams
- » System out line charts
- » Decision Trees/Tables

Explain about Entity Relationship Diagrams?

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a) An Entity-Relationship (ER) diagram is a data modeling technique that creates a graphical representation of the entities, and the relationships between entities.

b) The entity is defined as a distinguishable object that exists in isolation and is described by a set of attributes.

c) An entity may be a physical object such as a house or a car, an event such as a house sale or a car service, or a concept such as a customer transaction or order.

d) A relationship is the association among several entities.

e) For examples, a works relationship between an employee and a department,

f) There are three types of relationships between entities– one-to-one, one-to-many and many-to-many.

g) An attribute is a data element that describes an entity

Meaning	Symbol
Entity	Entity
Attribute	Attribute
Key Attribute	Key Attribute
Relationship	Relationship

Explain different types of relationships in Entity Relationship model?

a) **Relationship:** It is defined as an <u>association between two or more entities</u>

b) **One-to-One relationship (1:1):** A <u>single parent record</u> to <u>a single child record</u> or as in a husband record and wife record in a monogamous society.

c) **One-to-Many relationships (1:N):** A <u>single parent record</u> to <u>two or more child records</u> – for example, a teacher who teaches three single-section courses.

d) **Many-to-One relationships (M:1):** <u>Two or more parent records</u> to a <u>single child record</u>-for example, when three administrators in a small town share one minister.

e) **Many-to-Many relationships (M:N):** <u>Two or more parent records</u> to <u>two or more child records</u> – for example, when two or ore students are enrolled in two or more courses.

Write about Data Flow Diagrams and Describe the components of DFD?

» Data Flow Diagram (DFD) is a <u>graphical representation</u> of the flow of <u>data</u> through an information system.

» It shows the <u>technical or business processes</u> with the help of the <u>external data stored</u>, the data flowing from a <u>process</u> to another, and the results.

» These are <u>partitioned</u> into levels that represent increasing <u>information flow and functional</u> detail.

Major components of DFD:

1. **Entity:**

    a) An <u>entity</u> is the source or destination of data.

    b) The source in a DFD represents these entities that are outside the context of the system.

    c) Entities either provide data to the system (referred to as a source) or receive data from it (referred to as a sink).

    d) Entities are often represented as <u>rectangles</u>

2. **Process:**

    a) The process is the <u>manipulation or work that transforms data</u>, <u>performing computations</u>, making decisions (logic flow), or directing data flows based on business rules.

    b) Processes can be drawn as circles or a segmented rectangle on a DFD, and include a <u>process name</u> and <u>process number</u>.

3. **Data Store:**

    a) A data store is where a process stores data between processes for later retrieval by that same process or another one. Files and tables are considered data stores.

    b) <u>Data stores</u> are usually drawn as a rectangle with the right hand side missing and labeled by the name of the data storage area.

4. **Data Flow:**

    a) Data flow is the movement of data between the entity, the process and the data store. Data flow or trays the interface between the components of the DFD.

    b) Data flow is represented by an arrow, where the arrow is an notated with the data name.
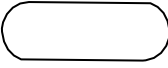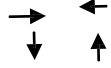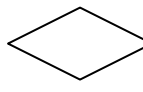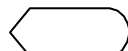
Symbols used in DFD:

Meaning	Symbols
Process	⬭ or ⬭
Data Store	▭ or ▭
Entity	▭
Data Flow	→

Write short notes on Flowcharts.

1. A **Flowchart** is a diagram prepared by the <u>programmer</u> of the <u>sequence of steps</u> involved in <u>solving a problem</u>.

2. It is an <u>essential tool for programming</u> and <u>it illustrates the strategy</u> and <u>thread of logic</u> followed in the program.

3. Flowcharts may be divided into <u>four categories</u> and as such they may be likened to the geographical map with regard to the extent of detail:

4. Flowcharts can be <u>divided into four categories</u>:

   a) **System Outline Charts:** Lists the inputs, files processed and <u>output</u>s without regard to any sequence whatever.

   b) **System Flowcharts:** Presents an overview of the data flow through all parts of a data processing system.

   c) **Run Flowcharts:** These are prepared from the system flowcharts and show the <u>reference of computer operations</u> to be performed.

   d) **Program Flowcharts:** Most detailed and are concerned with the <u>logical/arithmetic operations</u> and flow of data within the <u>CPU and input/output peripherals</u>.

Commonly used symbols in flowcharts:

Start/End	⬭	Flow Lines	→ ← ↓ ↑
Input/output	▱	Decision Box	◇
Process	▭	Print	⬠
Connectors	⬡ ⬠	Display	⬡

Explain the advantages and limitations of Flowcharting.

<u>Benefits:</u>

a) It is an <u>effective way of communicating</u> the program logic to others.

b) <u>Modular programming</u> can be effectively done.

c) Provide a <u>valuable documentation support</u>.

d) Keys to <u>correct coding</u>.

e) Very helpful in <u>detecting, locating and removing mistakes</u> in a program.

f) <u>Important tool for planning and designing</u> a new system.

Limitations of Flowcharting:

a) Drawing flowcharts is <u>time consuming and laborious exercise</u>.

b) <u>Use special symbols</u> and notations.

c) If <u>modifications are required</u>, it may <u>require complete redrawing</u>.

d) If flowchart is <u>drawn in detail, it</u> can be too <u>long & cumbersome</u>. If it is drawn summarily, it may lack necessary details.

e) No <u>uniform practice</u> is followed for drawing.

Write short notes on System Out line Charts?

» These charts <u>Lists the inputs, files processed and outputs</u> without regard to any sequence whatever.

» An example of this <u>chart of sales order Processing</u> :

Title	Sale order processing (SOP)	Systems	Document 3.1	Sheet 1
Inputs	Customer order details	**Processes** Order entry & acknowledgement Dispatch & update		
Files	Product catalogue Customer index cards Delivery cost list Factory stock list	**Outputs** Error reports Invoice details		

Explain about Decision Trees?

a) It is also known as <u>inference or logical tree is a collection of a basis</u> (condition) and a <u>conclusion (action).</u>

b) It is a <u>decision support tool</u> that uses a <u>tree-like model of decisions</u> and their possible consequences, including chance event outcomes, resource costs, and utility .

c) It is a one <u>way to display an algorithm</u>.

d) Decision trees are commonly used in <u>operations research</u>, to help identify a strategy most likely to reach a goal.

e) These are measured to be <u>one of the most accepted approaches</u> for <u>representing classifier</u>.

f) These are a <u>simple</u>, but <u>powerful form of multiple variable analyses.</u>

g) <u>Researchers</u> from a variety of disciplines such as statistics, machine learning, pattern identification and data mining have dealt with the issue of growing a <u>decision tree</u> from <u>available data</u>.
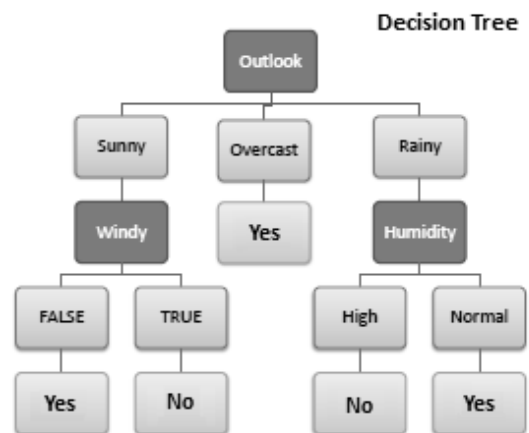
Decision Tree

Explain about Decision Tables?

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a) It is a <u>tabular representation</u> of <u>program logic</u>.

b) Displays <u>all conditions</u> and the appropriate <u>actions</u> to be taken for set <u>of conditions</u>.

c) It is divided into <u>four parts</u>:

   » **Condition Stub:** Lists the comparisons or conditions.

   » **Condition Entries:** Lists in its various columns the possible permutations of answer to the questions in the conditions stub.

   » **Action Stub:** Lists the actions to be taken along the various program branches.

Condition Stub	Condition Entries
Action stub	Action Entries

   » **Action Entries:** Lists in its columns corresponding to the condition entries the actions contingent upon the set of answers to questions of that column.

What are the advantages and disadvantages of Decision tables?

<u>Advantages:</u>

a) Provides a framework for a <u>complete and accurate statement</u> of processing

b) <u>Easier to construct</u> than a flow chart.

c) <u>Compact and easy</u> to understand.

<u>Disadvantages:</u>

a) **Total sequence:** The total sequence is not clearly shown

b) **Logic:** logic of a <u>system is simple</u>; these are <u>not serving the purpose better</u>.

PART B- 1 MARK QUESTIONS DEFINITIONS

1. **Process:** Process is a <u>coordinated and standardized</u> flow of activities <u>performed by people or machines</u>, which can <u>traverse functional boundaries</u> to achieve a <u>business objective</u> and creates value for <u>internal or external customers</u>.

2. **Process management:** It is a <u>system of interlinked processes</u> which involves intensive efforts to <u>map, improve and adhere</u> to <u>organizational processes</u>. It also performs the <u>activities of planning and monitoring</u> the performance of a process.

3. **Business Process Management:** *"The achievement of an <u>organization's objectives</u> through the <u>improvement, management</u> and <u>control of essential business processes</u>".*

4. **Six Sigma:** Six Sigma is a <u>set of strategies, techniques, and tools</u> for process improvement. It seeks to improve the quality of <u>process outputs</u> and <u>minimizing inconsistency</u> in manufacturing and <u>business processes.</u>

5. **Total quality management (TQM):** It is the <u>organization-wide effort</u> to <u>install and make permanent</u> a climate in which it continuously improves its <u>ability to deliver high-quality products</u> and services to customer.

6. **Accounting (Or) Book keeping life cycle:** It covers the business processes involved in <u>recording and processing accounting</u> events of a company. It <u>begins when a transaction</u> or financial event occurs and <u>ends with its inclusion</u> in the <u>financial statements.</u>

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7. **Order to cash process flow (O2C):** It covers all the business processes relating to fulfilling customer requests for goods or services. It involves transactional flow of data from the initial point of documenting a customer order to the final point of collecting the cash.

8. **Procure to pay (purchase to pay or P2P) life cycle:** It covers all the business processes relating to obtaining raw materials required for production of a product or for providing a service. It involves the transactional flow of data from the point of placing an order with a vendor to the point of payment to the vendor.

9. **Organizational business processes:** Organizational business processes are high-level processes that are specified in textual form by their inputs, their outputs, their expected results and their dependencies on other organizational business processes. These processes acts as supplier or consumer processes.

10. **Operational Business Processes:** These Processes are the basis for developing implemented business processes. Implemented business processes contain information on the execution of the process activities and the technical and organizational environment in which they will be executed.

11. **BPM automation:** BPM automation is a new way of working, monitoring and managing the organization, which could result in a new organizational structure.

12. **Accounting Information System:** AIS is defined as a computer-based system, which is used for collection, storage and processing of financial and accounting data that is used by decision makers.

13. **Functions of AIS :**
    » Collect and store data   » Record transaction
    » Safeguarding organizational assets

14. **Business Process Reengineering:** BPR is the fundamental rethinking and radical redesign of processes to achieve dramatic improvement, in critical, contemporary measures of performance such as cost, quality, service and speed.

15. **Value chain:** Value chain is defined as a chain of activities that a firm operating in a specific industry performs in order to deliver a valuable product or service for the market.

16. **Entity Relationship Diagrams:** It is a data modeling technique that creates a graphical representation of the entities, and the relationships between entities, within an information system.

17. **Data Flow Diagrams:** A graphical representation of the flow of data through an information system. DFDs may be partitioned into levels that represent increasing information flow and functional detail.

18. **Flowchart:** It is diagram prepared by the programmer of the sequence of steps involved in solving a problem. It defines the strategy and thread of logic followed in the program.

19. **Decision Trees:** A Decision Tree is a collection of a basis (condition) and a conclusion (action). It is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility.

20. **Decision Table:** It is table which may accompany a flowchart defining the possible contingencies that may be considered within the program and the appropriate course of action for each contingency

PART C – DIFFERENCES

1. **Functional Organization Vs. Process Organization.**

	Functional Organization	**Process Organization**
Work Unit	Department	Team
Key Figure	Functional Executive	Process Owner
Benefits	» Focus on functional excellence. » Easier to implement. » Clear management direction	» Responsive to market requirements. » Improved communication and collaboration » Performance measurements associated with process goals.
Weaknesses	» Barrier to communication between different functions. » Poor hand over between functions that affect customer service. » Lack of end-to-end focus to optimize organizational performance.	» Duplication of functional expertise. » Inconsistency of functional performance between processes. » Increased operational complexity.
Strategic Value	Supports cost leadership strategy.	Supports differentiation strategy.

2. **Flowchart Vs. Data Flow Diagram**

Flow chart	**Data Flow Diagram**
Presents steps to complete a process.	Presents the flow of data.
Do not have any input from or output to an external source.	It describes the path of data from an external source to internal source or vice versa.
The timing and sequence of the process is aptly shown by a flow chart.	Whether processing of data is taking place in a particular order or several processes are taking place simultaneously is described by a DFD.
shows how to make a system function.	Defines the functionality of a system.
Used in designing a process.	Used to describe the path of data that will complete that process.
Types of Flow charts - System, Data, Document and Program.	Types of DFD–physical data flow and logical dataflow.

THE END

2. INFORMATION SYSTEMS AND IT FUNDAMENTALS

PART A- FAST TRACK NOTES

Define Information System? Write about Information System Layers.

It is a <u>combination</u> of people, hardware, software, communication devices, network and data resources that processes data and information for a <u>specific purpose.</u>

a) It is a vehicle which supplies necessary information for decision making.

b) It is generally called as <u>Management Information System</u> (MIS) or <u>Computer Based Information System</u> (CBIS).

c) Uses <u>Computer System</u> and <u>Communication technology</u> to collect information from different operational points and disseminate them at different users for decision making.

d) The activities are :

» Collection, storing and processing of data

» Generation of Information Reports

» Dissemination of Information to right users

e) Provides timely information of right quality for better management decision making for developing business strategy.

f) Information system Layers are **Hardware**, **Software**, **Database**, **Network**, **People** and **Reports**.

Explain briefly about Central processing Unit?

It is like the brain of the computer. The main function of CPU or Processor is to execute Programs stored in memory and executes the Program instructions and coordinates the other hardware devices. It consists of three functional units:

a) **Control Unit (CU):** CU controls the <u>flow of data and instruction</u> to and from memory, interprets the instruction and controls which tasks to execute and when.

b) **Arithmetic and Logical Unit (ALU):** Performs arithmetic operations such as addition, subtraction, multiplication, and logical operations such as AND, OR, NOT and comparison operations such as Equal to, Greater than, Less than, etc.

c) **Registers:** These are <u>high speed memory units</u> within CPU for storing small amount of data (mostly 32 or 64 bits).

Registers could be:

» **Accumulators:** They can keep running totals of <u>arithmetic values</u>.

» **Address Registers:** They can store <u>memory addresses</u> which tell the CPU as to where in the memory an instruction is located.

» **Storage Registers:** They can <u>temporarily store data</u> that is being sent to or coming from the system memory.

» **Miscellaneous:** These are used for several functions for general purpose.

Explain briefly about Memory concept?

Various types of memory techniques/devices are given as follows:

A. Internal memory: Registers are internal memory within CPU, which are <u>very fast and very small</u>.

B. Primary Memory: These are devices in which any location can be accessed in any order (in contrast with sequential order). These are primarily of two types:

(i) Random Access Memory (RAM):

» This is <u>Read Write memory</u>.

» Information can be read as well as modified (i.e. write).

» <u>Volatile</u> in nature means Information is lost as soon as power is turned off.

(ii) Read Only Memory (ROM):

» This is <u>non-volatile</u> in nature (contents remain even in absence of power).

» Usually, these are used to store small amount of information for quick reference by CPU.

» Information <u>can be read, not modified</u>.

» Generally used by manufacturers to store data & Programmes.

C. Cache Memory:

a) Cache can be used in order to bridge the speed differences between Registers and Primary memory.

b) It is a smaller, faster memory, which stores copies of the data from the most frequently used main memory locations so that Processor/Registers can access it more rapidly than main memory.

c) It is the property of <u>locality of reference</u>, which allows improving substantially the effective memory access time in a computer system.

D. Virtual Memory:

a) If a computer lacks the RAM needed to run a Program or operation, Windows uses virtual memory to compensate.

b) Virtual memory combines computer's RAM with <u>temporary space on the hard disk</u>. When RAM runs low, virtual memory moves data from RAM to a space called a paging file.

c) Moving data to and from the paging file frees up RAM to complete its work.

d) Thus, Virtual memory is an allocation of hard disk space to help RAM.

E. Secondary Memory: Primary memory storage capacity is <u>limited, expensive and volatile</u>. Hence, it is necessary to have secondary storage to hold data and Programmes permanently.

a) Some of the commonly used secondary storage devices are – magnetic tape drives, magnetic disk drives (Hard disks, floppy disks, etc.), optical disk drives (CDs, DVDs, Blue ray disks etc.)

Define the term Software. Write about different types of softwares.

» Software is a <u>programme or a set of programs</u>.

» It is used to describe the <u>instructions</u> that tell the hardware how to perform a task. Without software, hardware cannot do any work.

There are basically two types of software's:

1. **System Software:**

   a) This is designed to make the computer system easier to use.

   b) This can't solve a particular problem, but makes easy to use necessary application programs.

   c) System software is essential for the development of application software.

   d) The categories of system software are:
   - » Operating System.
   - » Language translators.
   - » Utility Programs.
   - » Programming Languages etc.

2. **Application Software:**

   a) Computer software designed to help the user to perform specific tasks.

   b) It is designed for specific computer application. For example, a programme that prepares payroll for a business is an application programme.

Write about System Software in detail.

» It is computer software that is designed to operate the computer hardware and to give and maintain a platform for running application software.

» One of the most important system software is operating system (OS).

» OS is a set of computer Programs that manages computer hardware resources and acts as an interface with computer applications Programmes.

A variety of activities are executed by Operating Systems which include:

a) **Performing hardware functions:** OS acts as an intermediary between the application Programs and the hardware. It can determine the sequence in which jobs are to be executed.

b) **User Interfaces:** In earlier days command User Interfaces were widely used, but today most of the OS's are Graphic User Interface (GUI) which uses icons & menus.

c) **Hardware Independence:** Application Programme Interfaces (API) can be used by application developers to create application software, thus obviating the need to understand the inner workings of OS and hardware. Thus, OS gives us hardware independence.

d) **Memory Management:** Allow controlling how memory is accessed and maximize available memory & storage. OS also provides Virtual Memory by improving the capacity of RAM.

e) **Task Management:** Helps in allocating resources to make optimum utilization of resources. This facilitates a user to work with more than one application at a time.

f) **Networking Capability:** It provides system with features & capabilities to help connect computer networks. Like Linux & Windows 8 give us an excellent capability to connect to internet.

g) **Logical access security:** It provides logical security by establishing a procedure for identification & authentication using a User ID and Password. It can log the user access thereby providing security control.

h) **File management:** Keeps a track of where each file is stored and who can access it, based on which it provides the file retrieval.

Define the term Application Software? Explain its advantages and disadvantages.

A Software which is used to perform a specific task is called as an Application Software.
The different types of application software are:

a) **Application Suite:** Has multiple applications bundled together. Related functions, features and user interfaces inter with each other. E.g. MS Office 2010 which has MSWord, MS Excel, MS Access, etc.

b) **Enterprise Software:** Addresses an enterprise's needs and data flow in a huge distributed environment. E.g. ERP Applications like SAP.

c) **Enterprise Infrastructure Software:** Provides capabilities required to support enterprise software systems. E.g.: email servers, Security software.

d) **Information Worker Software:** Addresses individual needs required to manage and create information for individual projects within departments. E.g. Spreadsheets, CAAT (Computer Assisted Audit Tools), etc.

e) **Content Access Software:** Used to access contents and addresses a desire for published digital content and entertainment. E.g. Media Players, Adobe Digital etc.

f) **Educational Software:** Holds contents adopted for use by students. E.g. Examination Test CDs

g) **Media Development Software:** Addresses individual needs to generate and print electronic media for others to consume. E.g. Desktop Publishing, Video Editing etc.

Benefits:

a) **Addressing User needs:** The main advantage is that it meets the exact needs of the user. Since it is designed specifically with one purpose/specific purpose in mind.

b) **Less threat from virus:** The threat of viruses invading custom-made applications is very small, since any business that incorporates it can restrict access and can come up with means to protect their network as well.

Disadvantages:

a) **Regular updates:** Licensed application software gets regular updates from the developer for security reasons. Additionally, the developer also regularly sends personnel to correct any problems that may arise from time to time.

b) **Development is costly:** Developing application software designed to meet specific purposes can prove to be quite costly for developers.

c) **Infection from Malware:** If application software is used by many people and shared online, it carries a highly real threat of infection by a computer virus or other malicious Programmes.

Write about computer networks or network links.

» It is a collection of computers and other hardware interconnected by communication channel that allow sharing of resources and information.

» It is a group of devices connected to each other.

» Each component, namely the computer or a hardware device in a computer network is called a 'Node'.

Communication can be done through two ways:

a) **Connection Oriented networks:** Where in a connection is first established and then data is exchanged. Example is telephone networks.

b) Connectionless Networks: Where no prior connection is made before data exchanges. Data which is being exchanged from sender to receiver through <u>several paths</u> instead of a permanent path. Example is Internet.

The following four terms can be considered while transferring data from Sender to Receiver.

a) <u>Routing:</u> It refers to the process of deciding on <u>how to communicate the data</u> from source to destination in a network.

b) <u>Bandwidth:</u> It refers to the <u>amount of data</u> which can be sent across a network in given time.

c) <u>Resilience:</u> It refers to the ability of a network to <u>recover from any kind of error</u> like connection failure, loss of data etc.

d) <u>Contention:</u> It refers to the situation that arises when there is a <u>conflict</u> for some common resource.

Define the terms Database, Database Management System (DBMS).

A **Database** is a collection of related data.

A **DBMS** is a collection of Programs that enables users to create and maintain a database and facilitates the processes of defining, constructing, and manipulating databases for various applications.

Account Code	Account Head	Group head
11001	Travelling	Expenses
11002	Printing	Expenses
11003	Repairs	Expenses

RECORD — 11002 Printing Expenses
FIELD
MASTER ACCOUNT FILE

Briefly the terms can be explained below:

a) <u>Characters:</u> These are a collection of Bits.

b) <u>Field:</u> This is a collection of Characters.

c) <u>Record:</u> This is a collection of Fields.
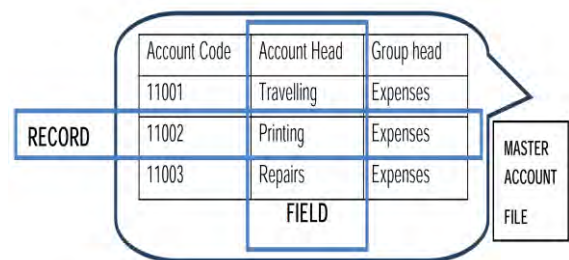
d) <u>File:</u> This is a collection of Records.

e) <u>Database:</u> This is a collection of Files**.**

Explain the major objectives of the organization while using DBMS and operations performed by DBMS?

DBMS can be used to solve the following objectives.

a) Know the information needs

b) Acquiring the needed information

c) Organizing the acquired information in a meaningful way

d) Assuring information quality

e) Providing software tools so that users in the enterprise can access information they require.

The following operations can be performed on Database.

a) Adding new files to database

b) Deleting existing files from database

c) Inserting data in existing files

d) Modifying data in existing files

e) Deleting data in existing files

f) Retrieving or querying data from existing files.

Commercially available Data Base Management Systems are Oracle, My SQL, SQL Servers and DB2 etc.

Explain the Hierarchical Database Model in detail.

a) A hierarchically structured database is arranged logically in an <u>inverted tree pattern</u>.

b) All records in hierarchy are called nodes. Each node is related to the others in a parent-child relationship.

c) Each parent record may have one or more child records, but no child record may have more than one parent record. The top parent record is called the **root** record.

d) Thus, this implements one-to-one and one-to-many relationships.
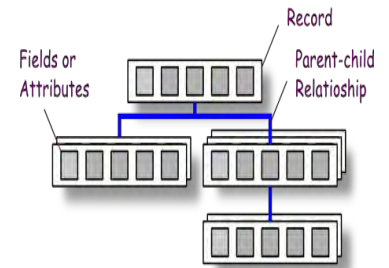
Features:

a) The hierarchy should be <u>pre-determined</u> and implemented and therefore, they are fixed in structure and are less flexible than other database structures.

b) <u>Adhoc queries</u> can't be made by the managers.

c) When the parent node is deleted, all the child nodes get automatically deleted.

d) If a particular record has to be traced then tracing will start from the root, continues downwards until the requisite record is located.

Explain the Network Database Model in detail.

a) It is built on the concept of multiple branches (lower-level structures) emanating from one or more nodes (higher-level structures), while the model differs from the hierarchical model in that branches can be connected to multiple nodes.

b) The network model is able to represent redundancy in data more efficiently than in the hierarchical model.

c) This feature allows the network model to implement the one-to-one, one-to-many, many-to-one and the many-to-many relationship types.

Features:
a) It is a modified version of Hierarchical Data model.
b) It is very difficult to develop this type of database structures.
c) It is useful for one-to-one, one-to-many and many-to-many record relationships.
d) The relationships should be pre-determined.

Explain the Relational Database Model in detail.

Here, data is arranged in tables that have rows and columns. In a relational Data model, a table is called <u>relation</u>, a row is called a <u>tuple</u> and a column is called an <u>attribute</u>. Some relational DBMS's use these terms; others use the terms <u>table, row and column</u>. Still others use file (for relation), record (for tuple) and field (for attribute).
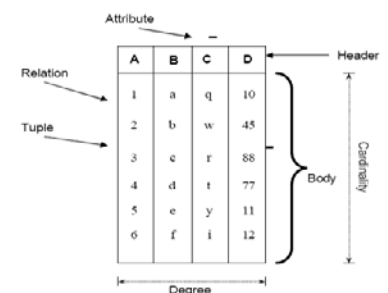
Advantages:
a) <u>Highly flexible</u> to Programme and retrieve data.
b) It is much <u>easier to use</u>.
c) Can handle queries in a more efficient way.

Disadvantages:

a) Processing efficiency is comparatively low.

b) Requires more processing capacity and memory.

c) Storage space requirements are high.

d) Processing can't be done without establishing the relationships.

Explain Object Oriented Database Model in detail.

a) Objects are entities conveying some meaning and possess certain attributes to characterize them and interacting with each other.

b) objects are predefined set of program code that is used to perform a specific task. It is based on the concept of objects and their interactions.

c) An Object-oriented database provides a mechanism to store complex data such as images, audio and video, etc.

d) An object-oriented database management system **(OODBMS)** helps programmers to create objects in a programming language, behave as a database object.

e) Here, new objects can be created or old objects can be modified, reused or copied.

f) Many engineering applications such as Computer Aided Design (CAD), Computer Aided Engineering (CAE), Multimedia Systems, Image Processing Systems and Expert Systems are some of the examples.

List out the Advantages and Disadvantages of a DBMS.

Major advantages are as follows:

a) **Permitting data sharing:** One of the advantages is that the same information can be made available to different users.

b) **Minimizing Data Redundancy:** Duplication of information is carefully controlled or reduced. Minimizing redundancy can reduce the cost of storing information on hard drives and other storage devices.

c) **Integrity can be maintained:** Data integrity is maintained with accurate, consistent, and up-to-date data. Updates and changes to the data only have to be made in one place in DBMS ensuring Integrity.

d) **Program and file consistency:** Standardized file formats and Programmes makes the data files easier to maintain because the same rules and guidelines apply across all types of data.

e) **User-friendly:** It makes the data access and manipulation easier for the user. It also reduces the reliance of users on computer experts.

f) **Improved security:** In database environment the responsibility of protecting the database is placed in the hands of one person or department. So it becomes easy to control access to data.

g) **Faster application development:** The data is already there in databases, application developer has to think of only the logic required to retrieve the data in the way a user needs.

Major disadvantages are as follows:

a) **Cost:** Implementing a DBMS system can be expensive and time-consuming, especially in large enterprises. Training requirements alone can be quite costly.

b) **Security:** Even with safeguards in place, it may be possible for some unauthorized users to access the database. If one gets access to database then it could be an all or nothing proposition.

Write about Wi-Fi technology.

a) Wi-Fi is the name of a popular Wireless Networking technology that uses radio waves to provide wireless high-speed Internet and reliable network connections.

b) It has limited range. A typical wireless access point might have a range of 32 meters (120 ft.).

c) The Wi-Fi Alliance defines Wi-Fi products based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards.

Usage:

a) Large companies and campuses often use Wi-Fi to connect buildings, meeting rooms, laboratories, Classrooms and large auditoriums.

b) Many corporations also provide wireless networks to their off-site and telecommuting workers to use at home or in remote offices.

c) Wi-Fi networks also work well for small businesses, providing connectivity between mobile salespeople, floor staff and behind-the-scenes finance and accounting departments.

Write about Bluetooth technology.

It is a wireless technology standard for exchanging data over short distances up to 50 meters (164 feet) from fixed and mobile devices, creating Personal Area Networks (PANs) with high levels of security.

Usage:

a) Using this technology, users can easily exchange files between computers, cellular phones, pagers, and Personal Digital Assistants over short distances.

b) Users can easily synchronize the information in their portable devices with a desktop or notebook computers.

c) Through the use of a mobile phone users can send pictures, videos, exchange business cards and also transfer files.

d) Bluetooth is really like a very low-power, short-range radio signal.

Few devices that utilize Bluetooth technology are:

» Keyboards and mice
» Printers
» Cell phones and headsets

» PDAs (Personal Digital Assistants)
» Desktop and laptop computers
» Digital cameras

Write about Android.

a) It is a Linux-based operating system designed primarily for touch screen mobile devices such as smart phones and tablet computers.

b) Android devices come in all shapes and sizes, with vibrant high-resolution displays and cameras.

c) The user interface is based on real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects.

d) It is open source software, with permissive licensing which allows the software to be freely modified and distributed by device manufacturers, wireless carriers and enthusiast developers.

What is Server? Explain different types of servers.

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1. A server is a computer (Hardware) or device on a network <u>dedicated to run one or more services</u> (as a host), to serve the needs of the users of other computers on a network.

2. In client-server architecture, a server is a computer Programme <u>running to serve the requests of other Program</u>, called the 'clients'. Thus, the server performs some computational task on behalf of 'clients'. The clients either run on the same computer, or they connect through the network.

3. Servers may be broadly classified as dedicated and non-dedicated.

    a) A **dedicated server** is completely reserved for the purpose of serving other computers and <u>no other activity can be performed </u>on such servers.

    b) A **non-dedicated server** is not completely reserved for this purpose i.e. <u>it can also be used simultaneously for other purposes</u>. For e.g., in a small office, a large desktop computer may act as both workstation and as a server.

4. There are different types of servers, based on the nature of service they provide.

    Those are:

    a) <u>File server:</u> This is <u>dedicated to store files</u>.

    b) <u>Print server:</u> This is a computer that <u>manages one or more printers.</u>

    c) <u>Network server:</u> This is a computer that <u>manages network traffic.</u>

    d) <u>Database server:</u> This is a computer system that <u>processes database queries</u>.

    e) <u>Application Server:</u> This is a Program that handles all application operations between users and an enterprise's backend business applications or databases.

    f) <u>Web Servers:</u> Web servers <u>deliver corresponding web pages </u>based on client's request. The server then fetches the home page named and sends it to client's browser.

    g) <u>Mail Server:</u> Mail servers move and store mail over corporate networks.

Describe different Computing Architectures.

It can be defined as the science and art of selecting and interconnecting hardware components to create computers that meet functional, performance and cost goals.

Computer architecture includes at least three main subcategories:

1. <u>Instruction Set Architecture (ISA):</u>
    » It is the abstract model of a computing system that is seen by a machine language Programmer.
    » Basically ISA is related to the Programming of a computer - that is, how the computer understands what each element in its basic language means, what instructions are to be carried out and in what order, etc.
    » It's a sort of 'bridge' between software and hardware.

    Classification of Instruction Sets:

    These are of basically two types.

a. Complex Instruction Set Computer (CISC):

» If the control unit contains a number of micro-electronic circuitry to generate a <u>set of control signals</u> and each micro- circuitry is activated by a micro-code, this design approach is called CISC design.

» Example processors are: Intel 386, 486, Pentium, Pentium Pro, Pentium II, Pentium III etc.

b. Reduced Instruction Set Computer (RISC):

» If there is <u>separate electronic circuitry</u> in the control unit, to execute each instruction which produces all the necessary signals, this is called RISC design. It is also called hard-wired approach.

» Examples of RISC processors: IBM RS6000, MC88100 processors etc. RISC processors use a small and limited number of instructions and mostly use hardwired control unit.

» These consume <u>less power</u> and have <u>high performance</u> than CISC.

2. <u>Micro Architecture:</u>

a) It, also known as Computer Organization. It is a lower level detailed description of the system.

b) <u>Completely describing the operation of all parts</u> of the computing system, and how they are inter-connected and inter-operate in order to implement the ISA.

c) The micro architecture essentially forms a specification for the logical implementation.

3. <u>System Design:</u> It includes all of the other hardware components within a computing system such as:

a) System interconnects-Computer buses and switches: Computer bus is a communication system that transfers data between components inside a computer, or between computers that covers all related hardware components (wire, optical 0fiber, etc.) and software, including communication protocol.

b) Memory controllers and hierarchies: The memory controller is a digital circuit which manages the flow of data going to and from the main memory and can be a separate chip or integrated into another chip.

c) CPU off-load mechanisms-Direct Memory Access (DMA): DMA is a feature of modern computers that allows certain hardware subsystems within the computer to access system memory independently of the central processing unit (CPU).

Write about Machine cycle? Explain the 'computing process' in detail?

<u>MACHINE CYCLE:</u>

a) Instruction Fetch (IF): fetch an instruction from the <u>current programme</u>, pass it to the next stage.

b) Instruction Decode (ID): instruction would be decoded to figure out what we actually need to do.

c) Execution (Ex): execution unit will then perform some operation like an addition, multiplication or Memory access stage will handle storing or loading values between the registers and the RAM.

d) Write Back (WB) the result to another register. So, it is ready to go for the next operation.
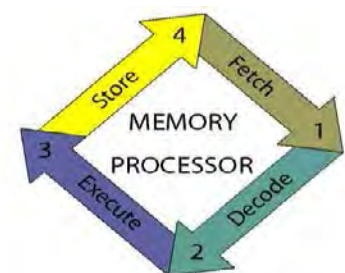
The above is the Machine Cycle, Fetch-Decode-Execute-Store which gets executed within CPU.

Fetch and decode are done by Control Unit (CU) whose job is to understand and explain to Arithmetic Logic Unit (ALU). ALU is used to execute and results are stored in Register.

Computing process:

» **Load:** Load some data from the <u>RAM into a register</u>.

» **Store:** Free up a register by storing its <u>data back into RAM.</u>

» **Add:** Add two pieces of data together. This could also be other common <u>math operations like subtract, multiply, divide, shift, etc.</u>

» **Compare:** Check to see if one piece of data is bigger or smaller than another.

» **Branch:** jump to the new location in the code and continue executing from there.

What is Cloud Computing? What are the types of Cloud Computing?

Cloud computing is the <u>use of various services</u>, such as software development platforms, servers, storage, and software, over the Internet, often referred to as the 'cloud'.

Cloud Computing Environment: It can consist of multiple types of clouds based on their deployment and usage.

Cloud Computing Types

a) **Public Clouds:** This is made available to the general public or a large industry group. They are <u>administrated by third parties</u> or vendors over the Internet, and services are offered on <u>pay-per-use</u> basis.

b) **Private Clouds:** This cloud computing environment resides within the boundaries of an organization and is used exclusively for the organization's benefits. These are also called internal clouds.

c) **Community Clouds:** This is the sharing of computing infrastructure in between organizations of the same community. For example, all Government organizations within India may share computing infrastructure on the cloud to manage data. The risk is that data may be stored with the data of competitors.

d) **Hybrid Clouds:** It is maintained by both internal and external providers. It is a composition of two or more clouds (Private, Community or Public). They have to maintain their unique identity, but are bound together by standardized data and application portability.
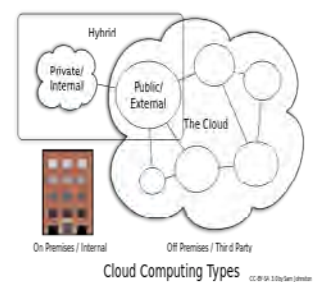
Explain the parts of Cloud Computing Architecture.

This architecture consists of two parts - <u>Front End and a Back End</u> that connect to each other through a network, usually Internet.

The front end is the side of computer user, or client, sees. The back end is the **'cloud'** section of the system.

Front end: It comprises of the client's devices (or it may be a computer network) and some applications are needed for accessing the cloud computing system. All the cloud computing systems do not give the same interface to users. For example-Web services like electronic mail programmes use some existing web browsers such as Firefox, Microsoft's Internet Explorer or Apple's Safari.

Back end: It refers to some physical peripherals. In cloud computing, the back end is cloud itself which may encompass various computer machines, data storage systems and servers. Groups of these clouds make a whole cloud computing system.

Along with these, Protocols and middleware can also be used to support Front-end and Back-end.

Protocols: It is the formal <u>set of rules</u> for communicating, including rules for timing of message exchanges, the type of electrical connection used by the communications devices, error detection techniques, means of gaining access to communications channels, and so on.

Middleware: It allows computers that are connected on networks to communicate with each other.

What are different Service Models of Cloud Computing?

There are 5 service models for cloud computing.

The service models are:

1. **Software as a Service (SaaS):**

   a) It includes a complete software offering on the cloud. Users can access a software application hosted by the cloud vendor on pay- per-use basis.

   b) SaaS is a model of software deployment where an application is hosted as a service provided to customers across the Internet by removing the need to install and run an application on a user's own computer.

   c) It is seen as a way for businesses to get the same benefits as commercial software with smaller cost outlay.

2. **Platform as a Service (PaaS):**

   a) It provides clients with access to the basic operating software and optional services to develop and use software without the need to buy and manage the underlying computing infrastructure.

   b) It has evolved from Software as a Service (SaaS) and Infrastructure as a service (IaaS).

   c) The major drawback is that it may lock us into the use of a particular development environment and stack of software components.

Cloud Clients
Web browser, mobile app, thin client, terminal emulator, ...

SaaS
CRM, Email, virtual desktop, communication, games,......

PaaS
Execution runtime, database, webserver, development tools,…

IaaS
Virtual machines, servers, storage load balancers, network,….

Application

Platform

Infra structure

3. **Infrastructure as a Service (IaaS):**

   a) It is the foundation of cloud services. It provides clients with access to server hardware, storage, bandwidth and other fundamental computing resources.

   b) The service may also include dynamic scaling so that if the customer needs more resources than expected, they can get them on the fly (probably to a given limit). It provides access to shared resources on need basis, without revealing details like location and hardware to clients.

4. **Network as a Service (NaaS):**

   a) It is a category where the capability provided to the cloud service user is to use network/transport connecting services.

   b) It involves optimization of resource allocation by considering network and computing resources as a whole.

5. **Communication as a Service (CaaS):**

   a) CaaS has evolved in the same lines as SaaS.

   b) It is an outsourced enterprise communication solution that can be leased from a single vender.

   c) The CaaS vendor is responsible for all hardware and software management and offers guaranteed Quality of Service (QoS).

   d) It allows businesses to selectively deploy communication devices and modes on a pay-as-you-go, as- needed basis.

   e) This approach eliminates the large capital investments. Examples are: Voice over IP (VoIP), Instant Messaging (IM).

Write briefly about Mobile Computing?

It is the <u>use of portable computing devices</u> (such as PDA, laptops, mobile phones, smart phones, tablet PC and Palmtops), in conjunction with mobile communications technologies, to enable users to access the Internet and data on their home or work computers, from anywhere in the world.

Mobile computing involves Mobile Communication, Mobile Hardware and Mobile Software;

a) Mobile Communication:

» Refers to the infrastructure put in place to ensure that <u>seamless and reliable communication</u> goes on.

» These would include devices such as Protocols, Services, Bandwidth and Portals necessary to facilitate and support the stated services. The data format is also defined at this stage.

» The signals are carried over the air to intended devices that are capable of receiving and sending similar kinds of signals.

b) Mobile Hardware:

» It includes <u>mobile devices or device components</u> that receive or access the service of mobility.

» They would range from Portable laptops, Smart phones, Tablet PC's to Personal Digital Assistants.

» These devices will have receptors that are capable of sensing and receiving signals.

c) Mobile Software:

» It is the actual Program that runs on the mobile hardware.

» This is the engine of that mobile device. In other terms, it is the essential component that makes the mobile device operates.

Explain Business Applications of Mobile Computing.

Mobile devices provide the capability to conduct business anywhere and enable users to seamless communicate and access information whether they are in the office or anywhere.

Some examples of business applications are:

a) There is increase in <u>workforce productivity</u> - anywhere, anytime by accessing and updating information as required.

b) Customer service can be improved by responding to customer queries on site or off site.

c) <u>Incident management</u> can be improved by resolving problems faster, without limitation of time, as the concerned employees can attend to these regardless of their location.

d) Enterprises can dynamically modify and update their offerings and offer new products and services altogether.

e) Mobile computing gives users the freedom to roam, with access to data and services at any time and in any place.

f) Used with proper security, enterprises can harness the power of this technology to create innovative opportunities for improving the quality and efficiency of business processes and services.

Why Most of the organisations use Computers and Information Technology?

Due to the following reasons, today most organizations use computers and technology.

1. **Communication Capabilities:**

   a) IT provides the enterprises with the resources, <u>to communicate quickly and effectively.</u>

   b) With these communication capabilities, enterprises can now <u>integrate their business functions and segments</u> spread across different geographical areas.

   E.g.: email, video conferencing equipment and internal chat rooms, Voice Over Internet Protocol (VOIP) telephones and smart-phones offer even more high- tech ways for employees to communicate.

2. **Data and Information Management:**

   a) Today, most enterprises store <u>digital versions of documents</u> on servers, storage devices and on cloud.

   b) These documents are <u>instantly available to anyone</u> with access rights, regardless of their geographical location.

   c) IT provides <u>security to physical and logical assets.</u>

3. **Automated Processes:**

   a) Business Process Automation (BPA) <u>optimizes and streamlines</u> the essential business processes, using the latest technology and automates the business functions.

   b) The idea behind BPA is to allow the organizations <u>to extract maximum benefit by using the available resources</u> to their best advantage, while keeping the operational cost as low as possible.

What is Business Process Automation? Explain the concept.

a) It can be defined as <u>removing the human element from existing business processes</u> by automating the repetitive or standardized process components.

b) BPA capabilities range from <u>automating a simple data-entry- manipulation task</u> to building complex, automated financial management processes using existing applications.

c) The benefits are cost reduction, elimination of human error, and allow management to do what they are best at.

d) With BPA, users can optimize and <u>streamline their business processes by automating</u> the process components.

e) BPA can make the business processes <u>faster and more efficient, robust, and flexible</u>.

The steps involved in any BPA are as follows:

a) Step 1: Define why we plan to implement BPA

b) Step 2: Understand the rules/ regulation under which it needs to comply with

c) Step 3: Document the process, we wish to automate.

d) Step 4: Define the objectives/goals to be achieved by implementing BPA.

e) Step 5: Engage the business process consultant.

f) Step 6: Calculate the ROI for project.

g) Step 7: Development of BPA.

h) Step 8: Testing the BPA.

What is Business Process Management? Explain the phases of BPM in detail.

It is the methodology used by enterprises to <u>improve end-to-end business processes</u> in various stages. An Enterprise Resource Planning application divides BPM into the following phases:

a) **Analysis phase:** This involves analysis of the current environment and current processes, identification of needs and definition of requirements.

b) **Design phase:** This involves evaluation of potential solutions to meet the identified needs, business process designing and business process modeling.

c) **Implementation phase:** This involves project preparation, blue printing, realization, final preparation, go live and support.

d) **Run and Monitor phase:** This involves business process execution or deployment and business process monitoring.

What are the activities which are tied up with the BPA application?

BPA application ties up the following activities:

a) **Integration:** BPA allows applications and operating systems not only to read data that the systems produce, but also to pass data between the component applications of the business process and to modify the data as necessary.

b) **Orchestration:** The process of orchestration (Coordination) enables the ability to bring tasks that exist across multiple computers and different business departments or branches <u>under one umbrella</u> that is the business process itself.

c) **Automation:** Orchestration and integration unite with automation to deliver the capability to provide a rules-based process of automatic execution that can span multiple systems and enable a more effective, nimble and efficient business process.

What are the benefits of automating an organization?

Following are the benefits of automating an organization:

a) Reducing the Impact of Human Error

b) Transforming Data into Information

c) Improving performance and process effectiveness

d) Making users more efficient and effective

e) Making the business more responsive

f) Improving Collaboration and Information Sharing

What type of IT Infrastructure should an organization need for automation?

The IT Infrastructure an organization should need for automation are:

a) **Database access and changes:** It provides access to data via ODBC (Open Database Connectivity) connections, data updates, file transfers.

b) **File replication and data backup:** It protects valuable data <u>by backing up databases</u> and key systems.

c) **Systems and event log monitoring:** It reviews and analyzes the event log and critical systems, and create multistep corrective action, such as restarting a server service. With BPA, these processes run automatically when certain events occur.

d) <u>Job scheduling:</u> It automates processes that perform a variety of daily or unscheduled tasks.

e) <u>Application integration</u>: It automates IT and business processes by combining applications that drive business. Complex processes such as database queries, data transformation and spreadsheet integration can be automated.

f) <u>File transfers:</u> It can be automated to deliver and retrieve data on set schedules.

g) <u>Printing:</u> It automation to simplify print jobs.

Explain the Importance of IT in Auditing?

a) Impact of IT is extensive for enterprises, professionals and individuals. IT encompasses <u>all aspects of functioning of enterprises</u> from strategy to operations, conception to completion and from ideation to value creation.

b) The dynamic changes in IT create challenges in not only enterprises but also accountants and auditors in their professional capacity.

c) Accountants and Auditors, in their various roles ranging from accounting to auditing have to use and embrace technology <u>to perform their jobs effectively and efficiently</u>. They deal with data in numerous (myriad) forms for analysis and decision-making.

d) As IT increasingly becomes <u>a key enabler in enterprises</u> of all types and sizes there is transformation from 'Technology Oriented' to 'Business and Technology Oriented'.

What are The Objectives of Audit? And Explain Differences in audit procedures?

The objectives of Audit would vary <u>depending on the type, purpose objective and scope of audit.</u> However, the general objectives of auditing in a computerized environment are:

a) <u>Existence:</u> Verify that the <u>assets, liabilities, ownership,</u> and/or activities are real.

b) <u>Authorization:</u> Verify that events have occurred in accordance with management`s intent.

c) <u>Valuation:</u> Verify that the accounting values fairly present items worth.

d) <u>Cutoff:</u> Verify that the transaction is recorded in the proper accounting period.

e) <u>Compliance:</u> Verify that the processing is in compliance with government laws and regulations, generally accepted accounting procedures, and the organization`s policies and procedures.

f) <u>Operational:</u> Verify that the Program, area, or activity is performed economically efficient, and effectively.

g) Assisting management in finding ways for implementing internal control recommendations.

h) Participating in specifying and designing computer control and other features for systems to be installed.

i) Determining whether efficient use is made of the organization's Computer resources.

j) Determining whether computer system used accomplishes the business objectives and goals.

Differences in audit procedures are given as follows:

a) <u>Study Technical Aspects:</u> Gather evidential matter related to <u>technical aspects of systems</u> such as all relevant documentation describing the computer facility, application Programmes, operating procedures, security procedures and so on.

b) <u>Use Unique Techniques:</u> Audit in a computerized environment would require <u>application of unique techniques</u> to these efforts. The auditor must understand the procedures for testing and evaluating Computer Controls.

c) **Audit Software Usage:** These procedures include the use of generalized audit software to survey the contents of data files, the use of specialized software to assess the contents of operating system parameter files and flow-charting techniques for documenting the automated applications.

Explain the Need for Controls in Information Systems.

a) Technology has increased the ability to capture, store, analyse and process tremendous amounts of data and information by empowering the business decision maker.

b) Today's dynamic global enterprises need information integrity, reliability and validity for timely flow of accurate information throughout the organization.

c) Safeguarding assets to maintain data integrity to achieve system effectiveness and efficiency is a significant control process.

d) A well designed information system should have controls built-in for all its sensitive or critical sections.

IS control procedure may include:

a) Strategy and direction

b) General Organization and Management

c) Access to IT resources, including data and Programmes

d) System development methodologies and change control

e) Operation procedures

f) System Programming and technical support functions;

g) Quality Assurance Procedures

h) Physical Access Controls

i) Business Continuity Planning (BCP) and Disaster Recovery Planning (DRP)

j) Network and Communication

k) Database Administration

l) Protective and detective mechanisms against internal and external attacks.

What risks will an organisation face due to the use of Information Technology? How should it be controlled?

Data handling capacity of computer combined with telecommunications technology greatly increases ability of an individual to access and perhaps to manipulate large quantities of data - within a relatively short time period: thus, increasing amount of potential risk of exposure.

a) Ready accesses to terminals are highly distributed leads to ease in perpetration of computer related crimes thereby increasing temptation for abuse.

b) On-line processing of data and validation checks would help the prospective perpetrator in guessing passwords and aid in circumventing to computer.

c) If threats are not anticipated and adequate controls are not designed to mitigate or counter them, system and its resources will be vulnerable.

d) The greatest exposure of all is a failure to recognize risks or potential impacts of those risks.

The four major areas in which controls have been affected are:

a) Realignment of functions, data entry and source of transactions may be centralized.

b) <u>Changes in custody of files and documents</u>. Data librarian may become in charge for data.

c) <u>Transfer of responsibilities</u>. Single action by user may complete the entire processing cycle of the transaction.

d) Decline of accountability Traditional functions, responsibilities and boundaries have been eliminated or are obscured by new methods.

What is Information System Life Cycle? Explain different phases of System development life cycle.

Information System Life Cycle is commonly referred as Software/System Development Life Cycle (**SDLC**), which is a methodology used to describe the <u>process of building</u> information systems.

It consists of a set of phases in which each phase of the SDLC uses the results of the previous one. This serves as a guideline to the designer while working on a project development.

Phase 1: System Investigation: This phase examines that <u>'What is the problem and is it worth solving'.</u> Feasibility Study refers to a process of evaluating alternative systems through cost/benefit analysis so that the most feasible/possible and desirable system can be selected for development.

Different types of Feasibility study are:

a) Technical feasibility

b) Economic feasibility

c) Legal feasibility

d) Operational feasibility

e) Schedule feasibility

Phase 2: System Analysis: This phase examines the <u>'What must the Information System do to solve the problem'.</u> System analyst would be gathering details about the current system and will involve:

a) Interviewing staff

b) Examine current business

c) Sending out questionnaires

d) Observation of current procedures

The system analyst will:

a) Examine <u>data and information flows</u> in the enterprise using data flow diagrams.

b) Establish what the <u>proposed system will actually do.</u>

c) Analyse <u>costs and benefits.</u>

d) Outline system implementation options.

e) Consider possible <u>hardware configurations.</u>

f) Make recommendations.

Phase 3: System Designing: This phase examines <u>'How the Information System will do what it must do to obtain the solution to the problem'</u>. This phase specifies the technical aspects of a proposed system in terms of:

a) Hardware platform

b) Software

c) Outputs

d) Inputs

e) User interface

f) Modular design

g) Test plan

h) Conversion plan

i) Documentation

Phase 4: System Implementation: This phase examines <u>'How the Solution will be put into effect'.</u> This phase involves the following steps:

a) <u>Coding and testing</u> of the system.

b) Acquisition of <u>hardware and software</u>.

c) Either installation of the new system or conversion of the old system to the new one.

d) In Installation, there are following major activities:

» Installing the new hardware, which may involve extensive re-cabling and changes in office layouts

» <u>Training the users</u> on the new system.

» <u>Conversion of master files</u> to the new system or creation of new master files.

Phase 5: System Maintenance and Review: This phase <u>evaluates results of solution and modifies the system</u> to meet the changing needs. Post implementation review would be done to address:

a) Programming amendments.

c) Modification of Reports.

b) Adjustment of clerical procedures.

d) Request for new Programmes.

System maintenance could be with following different objectives:

a) Perfective Maintenance

b) Adaptive Maintenance

c) Corrective Maintenance

PART B- 1 MARK QUESTIONS DEFINITIONS

1. **Information System:**

» It is a <u>set of interrelated components</u> working together to collect, retrieve, process, store and disseminate (distribute) information for the purpose of <u>achieving objectives</u> such as planning, coordination, analysis and decision making.

» Generally called as Management Information System (MIS) or <u>Computer Based Information System</u> (CBIS).

2. **Random Access Memory (RAM):**

» This is <u>Read Write memory</u>.

» Information can be read as well as modified (i.e. write).

» This is a Volatile memory. <u>Volatile</u> in nature means Information is lost as soon as power is turned off.

» Types of RAM : Dynamic RAM and Static RAM:

3. **Read Only Memory (ROM):**

» This is <u>non-volatile</u> in nature (contents remain even in absence of power).

» These are used to store small amount of information for quick reference by CPU.

» Information <u>can be read not modified</u>.

» Generally used by manufacturers to store data & Programs.

4. **Cache Memory:**

» Used in order to <u>bridge the speed differences</u> between Registers and Primary memory. It is a smaller, faster memory, which stores copies of the data from the most frequently used main memory locations so that Processor/Registers can access it more rapidly than main memory.

» There are two types in it. L1 Cache and L2 Cache.

5. **CPU:**

» Central Processing Unit (CPU) is also known as Processor, is the heart of the computer system. It takes data and instructions from the storage unit and performs all sorts of calculations and then sent back to the storage unit.

» It consists of three functional units: Control unit, Arithmetic Logical unit and 'Registers & cache'.

6. ALU:

» It performs the necessary arithmetic (Addition, Subtraction, Multiplication, and Division) and logical operations like AND, OR, NOT,comparing etc.

» It consists of temporary storage locations, called storage registers.

7. Control Unit:

» It determines the sequence in which computer programs and instructions are executed.

» It coordinates the activities of computer's peripheral equipment as they perform the input and output.

8. Data Bus: (N 07 – 1M)

» An electrical path or group of parallel wires that connects the CPU, memory, and the other hardware devices for the purpose of transmission of data.

» The number of wires in the bus can affect the speed at which data can travel between hardware components. Each wire can transfer one bit at a time.

9. Address Bus:

» A set of wires that connects CPU and RAM and carries the addresses of the memory locations from where data can be retrieved or stored.

» For example, with an eight-bit address bus, CPU can address maximum 256 memory locations.

10. Volatile Memory:

» The memory which loses their contents when the computer's power is turned off. E.g. RAM

» It requires constant power to maintain the stored information. Volatile memory is typically used only for primary storage.

11. Non-Volatile Memory:

» Some memory chips always retain the data they hold even when the computer is turned off.

» This type of memory is called non-volatile. (e.g. ROM).

12. PROM: (N 07 – 1M)

» Programmable Read Only Memory is one sort of Read Only Memory which can be programmed as per user requirements.

» It is non-volatile memory which allows the user to program the chip with a PROM writer.

» The chip can be programmed only once, and the contents of the program stored on it cannot be altered.

13. EPROM:

» EPROM stands for Erasable Programmable Read Only Memory.

» EPROM chip can be electrically programmed with EPROM programmer.

» Exposing the EPROM chip to ultraviolet light can erase contents of the EPROM.

14. EEPROM:

» EEPROM stands for Electrically Erasable Programmable Read Only Memory.

» It is an EPROM but the data can be erased by applying electrical charges.

15. Flash Memory: (M 08 – 1M)

» It is other name given to <u>EEPROM</u> Chips

» It is <u>non-volatile</u> and have <u>no moving parts</u>. So, they are very fast.

» These memory chips are very <u>small in size</u> and consume very <u>less power</u>.

» Currently these chips are being used in <u>portable devices</u>.

16. Cathode-Ray Tube (CRT):

» A vacuum tube that uses an <u>electron gun</u> (cathode) to emit a beam of electrons that illuminate phosphors on a screen as the beam sweeps across the screen repeatedly. A monitor is often called a CRT.

» Here an Electron beam is controlled by Horizontal and vertical plates/coils and are focussed on the screen (Phosphor coated screen).

» The size of CRTs are huge and consume more power than LCDs & LEDs.
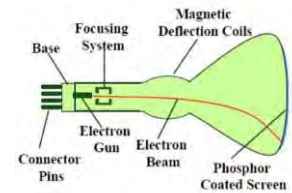
17. Liquid Crystal Display (LCDs): A low-powered display technology used in laptop computers where <u>rod-shape crystal molecules</u> change their orientation when an electrical current flows through them.

» LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, clocks, watches and calculators.

» They consume very less power and are portable to CRTs.

18. Laser Printer:

» A printer that forms images using an electrostatic process, the same way a photocopier works.

» Laser is the heart of these printers. A separate CPU is built into the printer to interpret the data and to control the Laser beam.

» Laser printers can print alphanumeric characters, high quality images, graphs, etc.

19. Ink-jet Printer: A printer that makes images by forcing <u>ink droplets</u> through nozzles.

» Here there is no direct contact between the printer's print head and paper.

» These are generally used in Digital color labs for printing Photographs and images on a specialized paper.

» Types of Inkjet Printers: Liquid Inkjets and Solid Inkjets.

20. Plotter:

» A graph plotter is a device capable of tracing out graphs, designs and maps onto paper and even on plastic or metal plates. High degree of accuracy can be achieved, even upto one thousandth of an inch.

» It is more software dependent than any other peripheral device and it needs much more instructions than a printer.

21. Speakers:

» Speakers are general audio output devices; contain small amplifiers to boost up the audio information.

» Speakers are connected to the sound card on the motherboard.

» Speakers contain a magnet which moves back and forth with the changing current, creating vibrations   called sound.

22. System Software:

» Computer software designed to operate the computer hardware and to provide and maintain a platform for running application software.

» System software is essential for the development of application software.

» The purpose of system software is to insulate the application programmer as much as possible from the details of the computer.

23. Application Software:

» Computer software designed to help the user to perform specific tasks.

» It is designed for specific computer application. For example, a programme that prepares payroll for a business is an application programme.

24. Operating System:

» OS is a set of computer Programmes that manages computer hardware resources and acts as an interface with computer applications Programmes.

» The operating system is a vital component of the system software in a computer system.

25. Computer networks:

» It is a collection of computers and other hardware interconnected by Communication channel that allow sharing of resources and information.

» Each component, namely the computer or a hardware device in a computer network is called a 'Node'.

26. Database: A **Database** is a collection of related data.

A database is a logically coherent collection of data with some inherent meaning. A random assortment of data cannot correctly be referred to as a database.

27. DBMS: It **is** a collection of Programs that enables users to create and maintain a database and facilitates the processes of defining, constructing, and manipulating databases for various applications.

28. Database model: A database model is a type of data model that determines the logical structure of a database and fundamentally determines in which manner data can be stored, organized and manipulated. Examples are

» Hierarchical Database Model,

» Network Database Model,

» Relational Database Model, and

» Object oriented Database Model

29. Computer Science:

» It refers to the scientific and practical approach to computation and its applications.

» It is the systematic study of the feasibility, structure, expression, and mechanization (modernization) of the methodical processes (or algorithms) that underlie the acquisition, representation, processing, storage, communication of, and access to information, whether such information is encoded in bits and bytes in a computer memory or transcribed engines and protein structures in a human cell.

30. Computer Engineering:

» It refers to the discipline that <u>integrates several fields of electrical engineering and computer science</u> required to develop computer hardware and software.

» Computer engineers are involved in <u>many hardware and software aspects</u> of computing, from the design of individual microprocessors, personal computers, and supercomputers, to circuit design.

» This focuses not only on how computer systems work but also <u>how they integrate and work a holistic system.</u>

31. Information System (IS):

» It refers to the study of complementary networks of hardware and software that enterprises, employees or individuals use to collect, process, create, store and distribute data. Any specific Information System aims to support operations, management and decision making.

» It also refers to not only Information and Communication Technology (ICT) that an enterprise uses but also to the way in which staff, customers and vendors interacts with ICT to facilitate business processes in an integrated manner.

32. Information Technology (IT):

» It refers to the application of computers and telecommunications <u>to store, retrieve, transmit and manipulate data</u> in for processing of information in enterprises.

» Generally, IT encompasses not only computers and computer networks but also other information distribution technologies such as television and telephones.

» IT industry in general is supported by multiple industry sectors such as computer hardware, software, electronics, semi-conductors, internet, telecom equipment, e-Commerce and computer services.

33. Software Engineering:

» It refers to the application of a systematic, disciplined, quantifiable approach to the design, development, operation, and maintenance of software, and the study of these approaches, which is primarily the application of engineering to software.

» Enterprises use IT to provide information systems, which process and provide information to users.

» As accountants and auditors, we are primarily concerned and need to be well versed with the disciplines of Information Systems and Information Technology in their practical deployment.

34. Machine Cycle:

Machine cycle = Fetch + Decode + Execute + Store

Fetch and decode are done by Control Unit (CU) whose job is to understand and explain to Arithmetic Logic Unit (ALU). ALU is used to execute and results are stored in Register.

35. Public Clouds:
They are made available to the general public or a large industry group. They are <u>administrated by third parties</u> or vendors over the Internet, and services are offered on <u>pay-per-use</u> basis. The key benefits are:

» It is widely used in the development, deployment and management of enterprise applications, at affordable costs;

» It allows organizations to deliver highly scalable and reliable applications rapidly and at more affordable costs.

36. Private Clouds:
This cloud computing environment resides within the boundaries of an organization and is used exclusively for the organization's benefits. These are also called internal clouds.

The benefit of a Private Cloud is that it enables an enterprise to manage the infrastructure and have more control, but this comes at the cost of IT department creating a secure and scalable cloud.

37. **Community Clouds:** This is the sharing of computing infrastructure in between organizations of the same community. For example, all Government organizations within India may share computing infrastructure on the cloud to manage data. The risk is that data may be stored with the data of competitors.

38. **Hybrid Clouds:** It is maintained by both internal and external providers. It is a composition of two or more clouds (Private, Community or Public). They have to maintain their unique identity, but are bound together by standardized data and application portability.

39. **Mobile Computing:**

   » It is the use of portable computing devices (such as laptop and handheld computers), in conjunction with mobile communications technologies, to enable users to access the Internet and data on their home or work computers, from anywhere in the world.

   » It is enabled by use of mobile devices such as PDA, laptops, mobile phones, smart phones, tablet PC and Palmtops on a wireless network.

40. **Wi-Fi:** (Wireless Fidelity)

   » Wi-Fi networks have limited range.

   » The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards.

   » Wi-Fi can be less secure than wired connections because an intruder does not need a physical connection.

   » Large companies and campuses often use to connect buildings, meeting rooms, laboratories, Classrooms and large auditoriums.

41. **Bluetooth:**

   » It is a wireless technology standard for exchanging data over short distances up to 50 meters (164 feet) from fixed and mobile devices, creating Personal Area Networks (PANs) with high levels of security.

   » Users can easily synchronize the information in their portable devices with a desktop or notebook computers.

   » Both data and voice transmissions can be sent and received through the use of short range networks.

42. **LAPTOP:**

   » A small, portable computer and small enough that it can sit on a lap.

   » Notebook (Laptop) is an extremely lightweight personal computer.

   » Use flat-panel technologies, to produce a lightweight and non- bulky display screen.

43. **Tablet:**

   » A tablet computer, or simply tablet is a one piece general-purpose computer contained in a single panel. Its distinguishing characteristic is the use of a touch screen as the input device.

   » Modern tablets are operated by fingers, and a stylus is an option, whereas earlier tablets required a stylus.

44. **Smart phone:**

   » A mobile phone built on a mobile operating system, with more advanced computing capability connectivity than a feature phone.

» These handheld devices <u>integrate mobile phone capabilities</u> with the more common features of a handheld computer or PDA.

» Modern devices include high-resolution touch screens and web browsers that display standard web pages as well as <u>mobile-optimized</u> sites.

45. touchpad:

» It is a <u>pointing device featuring a tactile sensor</u>, a specialized surface that can translate the motion and position of a user's fingers to a relative position on screen.

» It is a common feature of laptop computers, and are also used as a substitute for a mouse where desk space is limited.

» These operate in one of several ways, including capacitive sensing and conductance sensing.

46. iPad:

» It is a line of tablet computers designed and <u>marketed by Apple Inc.</u>, which runs Apple's iOS.

» The user interface is built around the device's multi-touch screen, including a <u>virtual keyboard</u>.

» It has <u>built-in</u> Wi-Fi and cellular connectivity.

» It can shoot video, take photos, play music, and perform Internet functions such as web-browsing and emailing. Other functions—games, reference, GPS navigation, social networking, etc.—can be enabled by downloading and installing apps.

47. iPod:

» The iPod is a line of portable media players designed and <u>marketed by Apple Inc.</u>

» There are four current versions of the iPod: the ultra-compact iPod Shuffle, the compact iPod Nano, the touchscreen iPod Touch, and the hard drive-based iPod Classic.

» iPods can serve as external data storage devices. Storage capacity varies by model, ranging from 2 GB for the iPod Shuffle to 160 GB for the iPod Classic.

48. Android:

» It is a Linux-based operating system designed primarily for touch screen mobile devices such as smart phones and tablet computers.

» It is <u>open source</u> software, with permissive licensing which allows the software to be freely modified and distributed by device manufacturers, wireless carriers and enthusiast developers.

49. Server:

» It is a computer (Hardware) or device on a network <u>dedicated to run one or more services</u> (as a host), to serve the needs of the users of other computers on a network.

» In client-server architecture, a server is a computer Program <u>running to serve the requests of other Programs</u>, called the 'clients'. Thus, the server performs some computational task on behalf of 'clients'. The clients either run on the same computer, or they connect through the network.

» Servers may be broadly classified as dedicated and non-dedicated.

50. integrated circuit (IC):

» An IC is also referred to as a **chip**, or a **microchip**, is a set of electronic circuits on one small plate or wafer of semiconductor material, normally silicon.

» ICs can be made very compact, having anywhere from a few hundred to over a billion transistors and other electronic components in an area the size of a fingernail.

» Today, Integrated circuits are used in several electronic equipments like Computers, mobile phones, and other digital home appliances.

51. Multiprocessing: Multiprocessing is the use of two or more Central Processing Units (CPUs) within a single computer system to allocate tasks between them.

52. **Hardware Virtualization: Hardware Virtualization** or **Platform Virtualization** refers to the creation of a virtual machine that acts like a real computer with an operating system.
Software executed on these virtual machines is separated from the underlying hardware resources.

53. **Groupware:** it is also known as Team-ware, Collaboration Software is software that allows collective and collaborative working of teams from different geographical locations on an online and real-time basis.

54. **Computer Bus:** A communication system that transfers data between components inside a computer or between computers that covers all related hardware components (wire, optical fiber, etc.) and software, including communication protocol.

55. **Memory Controller:** It is a digital circuit which manages the flow of data going to and from the main memory and can be a separate chip or integrated into another chip.

56. **Direct Memory Access (DMA):** It is a feature of modern computers that allows certain hardware subsystems within the computer to access system memory independently of the Central Processing Unit.

PART C – DIFFERENCES

1. **Hardware Vs. Software.**   (M 06 – 5M)

No.	Distinction	Hardware (HW)	Software (SW)
1.	Meaning	Refers to a component that constitutes computer system.	Refers to means of controlling the computer equipment.
2.	Visibility	It refers to physical, visible components of a computer.	If refers to invisible components of a computer.
3.	Components	It is made up of input devices, output devices, C.P.U., storage devices, communication devices etc.	Software is made up of data and instructions.
4.	Producers	Hardware is produced by Hardware manufacturers. E.g. IBM, INTEL, HCL, WIPRO, HP, SONY, AMKETTEE	System Software like WINDOWS are manufactured by big software companies like MICROSOFT. Some readymade application Software like "TALLY, Ex etc. are manufactured by Software companies like TCS, Infosys etc. Other application software may be prepared by individual programmers and end users.
5.	Modularity	Most of the Hardware devices are purchased initially but few of them can be added later on.	Most of the Software can be purchased initially along with Hardware. But application software is procured in stages, depending on requirements.
6.	Changes/ Alteration	Hardware once procured does not go through frequent changes except for new additions or releases or updation.	System Software once procured do not go through frequent changes, except for updation. Application software goes through frequent changes whenever policies and procedures are changed.
7.	Virus	Do not get affected by computer virus.	Only Software gets affected by computer virus.

2. Virtual Memory Vs. Main Memory.   **(M 03 – 4M)**

No.	Virtual Memory	Main Memory
1.	It does not exist in reality. Its presence can be experienced logically but not physically.	It is also known as primary memory and it exists physically.
2.	It is a technique adapted by the operating system.	It is directly addressed and controlled by CPU.
3.	With the help of this facility even large files can be operated on small amount of RAM.	This memory will decide the speed of processing. More the amount of RAM faster will be the processing.
4.	Virtual memory is a concept which depends on the software that is being used.	Main memory will exists inside the system unit and is independent of software being used.
5.	In this memory parts of programs are called segments or pages.	Here parts of programs are known as blocks.
6.	It is not expandable and its size depends on the program being used. Thus virtual memory being used by the computer, changes from time to time.	It is expandable and its size is independent of the program being used.

3. Primary Storage Vs. Secondary Storage.

No.	Primary Storage	Secondary storage
1.	Added to the system as a part and parcel of the circuitry.	Added to the system as a supplementary to primary storage.
2.	It is electronic in nature and is usually supplied in the form of chips.	Magnetic or optical in nature and supplied in the form of tapes and disks.
3.	Provides Random access to data.	Provides Sequential / direct access to data.
4.	Volatile i.e. its contents are lost when power is lost.	Non volatile i.e. it does not lose its contents even when the power is lost.
5.	Low capacity.	High capacity.
6.	Fast access to data.	Slow access to data.
7.	High cost.	Low cost.
8.	Generally a computer consists of few MB's of memory.	Generally a computer consists of few GB's to TB's of memory.

4. RAM Vs. ROM.   **(M 05 – 4M)**

No.	RAM	ROM
1.	RAM is a volatile memory and when the computer is turned off, RAM loses its data. When the computer is turned on again, operating system and other files are once again loaded into RAM usually from the hard disk.	Unlike RAM, ROM is non-volatile. The contents of ROM remain even after the computer is switched off.
2.	This is Read Write memory wherein information can be read as well as modified.	Originally, the ROM used to be read-only; however, the new versions of ROM allow limited rewriting making it possible to upgrade firmware such as the BIOS by using installation software.

5. Hierarchical Database Model Vs. Network Database Model.   **(M 05 – 4M)**

No.	Hierarchical Database Model	Network Database Model
1.	The hierarchical model permits a record to be a member of only one set at one time.	Unlike the hierarchical mode, the network model permits a record to be a member of more than one set at one time.
2.	The hierarchical data structure implements one-to-one and one-to-many relationships.	The network model allows us to represent one-to-one, one-to-many and many-to-many relationships.
3.	Each parent record may have one or more child records, but no child record may have more than one parent record.	Each parent record may have one or more child records, and even a child record may have more than one parent record.
4.	The hierarchical model does not represent redundancy in data efficiently.	The network model is able to represent redundancy in data more efficiently than in the hierarchical model.
5.	The hierarchical data structures require specific entrance points to find records in a hierarchy.	The network data structures can be entered and traversed more flexibly.

6. Complex Instruction Set Computer (CISC) Vs. Reduced Instruction Set Computer (RISC):
                                                                                 (M 05 – 4M)

Complex Instruction Set Computer (CISC):

» If the control unit contains a number of micro-electronic circuitry to generate a <u>set of control signals</u> and each micro- circuitry is activated by a micro-code, this design approach is called CISC design.

» Examples of CISC processors are: Intel 386, 486, Pentium, Pentium Pro, Pentium II, Pentium III processors etc.

» CISC chips have a large, variable length and complex instructions and generally make use of complex addressing modes.

» But at the same time, they <u>are complex as well as expensive to produce</u>.

» Now-a-days, most of the personal computers use CISC processors.

Reduced Instruction Set Computer (RISC):

» To execute each instruction, if there is <u>separate electronic circuitry</u> in the control unit, which produces all the necessary signals, this approach of the design of the control section of the processor is called RISC design. It is also called hard-wired approach.

» Examples of RISC processors: IBM RS6000, MC88100 processors etc. RISC processors use a small and limited number of instructions and mostly use hardwired control unit.

» These consume <u>less power</u> and have <u>high performance</u>.

» However, RISC processors are <u>faster, less complex and less expensive</u> than CISC processors because of their simpler design.

» Now-a-days, most of the workstation computers use RISC processors.

THE END

3. TELECOMMUNICATION & NETWORKS

PART A – FAST TRACK NOTES

Write about different types of telecommunication networks?

Telecommunication networks can be classified on the basis of:

a. Area of Coverage   **c.** Ownership-based

b. Functional Based   **d.** Media-based etc.

Class I	Classification based on Area of Coverage
LAN	A Local Area Network (LAN) is a group of computers and network devices connected together, usually within the same building, campus or spanned over limited distance.
MAN	A Metropolitan Area Network (MAN) is a larger network that usually spans in the same city or town up to 40km of geographical location. E.g. Cable network.
WAN	A Wide Area Network (WAN) is not restricted to a geographical location, although it might be confined within the bounds of a state or country.
Class II	**Functional Based Classification**
Client-Server	The providers of a resource or service are called servers and service requesters are called clients.
Peer-to-Peer	Each individual node in the network (called "peers") act as both suppliers and consumers of resources.
Class III	**Ownership-based Classification**
Public Network	Network established for all users across the world is known as public network. E.g.: Internet.

Private Network	Private Network is used by particular organization, particular campus or particular enterprise only.
Virtual Private Network (VPN)	It is a network that uses a public network, such as the Internet, to provide secure access to organization's private network.
Class IV	**Media based**
Wired Network	Network communication supported by physical (wired) medium
Wireless Network	Network communication supported by wireless medium

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Write short notes on need and scope of computer networks? (OR) Describe the ways in which a computer network can help business? (J 09 - 7M)

The Organizations can improve efficiency by sharing information such as common files, databases and business application software over a telecommunication network.

Some of the advantages of networks in an organization:

a. **File Sharing:** It provides sharing and grouping of data files over the network.

b. **Resource Sharing:** It provides sharing of computer resources such as hard disk, printers etc. by multiple users simultaneously.

c. **Remote Access:** Allows users to remotely access the data and information from organization's network via Internet in cost effective manner.

d. **Shared Databases:** Facilitates simultaneous access to the shared databases by multiple users at the same time by ensuring the integrity of the database.

e. **Fault Tolerance:** In a network <u>accidental data loss</u> can be prevented by maintaining redundant hardware, tape libraries, UPS, etc.

f. **Internet Access and Security:** It provides access to the Internet for transferring the document and to access the resources available on World Wide Web by maintaining <u>data security.</u>

Write about different kinds of cables commonly used in LAN's (Or) What are the popular guided media available?

<u>COMMUNICATION MEDIUM</u>:

» It is the <u>physical path</u> between the <u>sender and the receiver</u> that carries the <u>data in the form of signals</u>.

» It is divided into <u>two groups: Guided media and unguided media.</u>

» Guided Transmission Media uses a <u>"cabling" system</u>. Also known as <u>Bound Media</u>.

Some of the <u>common examples</u> are explained below:

a. **Twisted – Pair cables:**

- Twisted-pair wires or cables are similar to cables used for home and office telephone system and many LANs and WANs.

- Used for both voice and data transmissions.

- <u>Two insulated wires are twisted</u> around each other.

- It is <u>inexpensive and easy to install</u>.

b. **Coaxial Cable:**

- It is a well established and <u>long-used cabling system</u> for terminals and computers.

- It consists of copper or aluminum wire wrapped with spacers to insulate and protect it.

- They can carry a large volume of data and allows high-speed data transmission
- Used in high-service metropolitan areas for cable TV systems, and for short-distance connection of computers and peripheral devices.

c. **Fiber Optic Cables:**
  - Use <u>light as the communication medium</u>.
  - Consists of one or more hair-thin filaments of glass fiber wrapped in a protective jacket.
  - Easy to install and even used undersea.
  - Speed of communications is 10,000 times faster than that of microwave and satellite systems.

What are the popular unguided media available?

UNGUIDED MEDIA:

- <u>Unguided Transmission Media</u> or <u>unbound media</u> consists of a means for the data signals to travel but nothing to guide them along a specific path.
- Some of the <u>common examples</u> of unguided media are:

a. **Radio Waves:**
  - » They are <u>invisible form of electromagnetic radiation</u> that varies in wavelength from around 1 millimeter to 1,00,000kms.
  - » Most <u>commonly used</u> transmission media in <u>Wireless Local Area Networks.</u>

b. **Micro Waves:**
  - » These are <u>radio waves</u> with wavelengths ranging from as long as 1 meter to as short as 1 millimeter or equivalently, with frequencies between <u>300 MHz and 300 GHz</u>.

» <u>Used for communication</u>, radar systems, radio astronomy, navigation and spectroscopy.

c. Terrestrial Microwave:

» It uses the <u>atmosphere as the medium </u>through which to transmit signals, and is used extensively for high-volume as well as <u>long-distance </u>communication of <u>both data and voice</u> in the form of <u>electromagnetic waves.</u>

d. Infrared Waves:

» <u>Used in industrial, scientific and medical applications</u>.

» Night-vision devices using infrared illumination allow people or animals to be observed without the observer being <u>detected.</u>

e. Communication Satellites:

» <u>They use the atmosphere </u>as the medium.

» Satellite is a <u>solar-powered electronic device </u>that receives, amplifies, and retransmits signals.

» It acts as a <u>relay station</u> between satellite transmissions stations on the ground (earth stations).

» <u>Extensively used for high-volume</u> long-distance communication.

» <u>Cost-effective </u>for moving large quantities of data over <u>long distances</u>.

» They are <u>very expensive </u>and have an age limit of 7-10 years.

Write about Local Area Networks (LAN)? Explain the characteristics of LAN?

<u>LOCAL AREA NETWORK</u><u>:</u>

a) <u>LAN connect information- processing devices </u>within a <u>limited physical area</u>, Such as <u>areas </u>such as Offices, Classrooms, Buildings, Manufacturing plant etc.

b) Main <u>purposes</u> of LAN are to link computers <u>within an organisation</u> and allow thse <u>computers to communicate</u> with each other.

<u>CHARACTERISTICS OF LANS:</u>

- **Communication Media:** It uses variety of <u>telecommunications media</u>, such as <u>ordinary telephone wiring</u>, coaxial cable, or wireless radio systems to <u>interconnect</u> workstations and peripherals.

- **Network interface card:** To <u>communicate over the network</u>, a PC usually has a <u>circuit board</u> called a <u>network interface card.</u>

- **File Server:** It is used for <u>managing files</u>, servicing the <u>network printers, handling communications</u> etc. & it may be <u>dedicated or non-dedicated</u>.

- **Network OS:** It is loaded in the <u>server's hard disk</u> along with system management tools and it <u>controls</u> telecommunications and the <u>use of network resources.</u>

- **Communication and sharing:** LANs allow end users in a workgroup to <u>communicate electronically</u>; <u>share</u> hardware, software, and <u>data resources.</u>

Why users prefer Local Area Networks? (Or) Of late many users are going for LAN system. Explain why? (Or) Factors contributed to the growth of LANs   (N 03, 07 - 5M)

- **Security:** It can be achieved using servers that are <u>locked physically and logically</u>.

- **Expanded PC usage through inexpensive workstation:** Once LAN is set up, it is very easy and <u>economical to accommodate</u> additional employees through <u>diskless PCs</u>.

- **Electronic mail and Message Broadcasting:** E-mail allows users to communicate <u>easily with other employees</u>& to communicate a message to everyone, <u>broadcasting</u> facility can be used.

- **Organizational benefits:** With the shared computer hardware, software and peripherals, we can reduce cost & drastic reduction in time & cost of training man power to use the systems.

- **Data management benefits:** As the data is stored centrally, it is easy to manage it.

- **Software cost and up gradation:** As it supports shared software, purchasing a network version can save lot of money.

- **Distributed processing:** Many PCs are installed around the office and these machines represent the basic platform for a LAN with inter-user communication and information exchange.

Explain the basic features & usage of Wide Area Networks?

» It is a world wide digital communication system which interconnects different sites, computers and user terminals that are spread over a wide area.

» Users can send electronic messages, data, graphics, programs etc. rapidly & economically.

Characteristics:

» Transmitting & receiving equipments are distributed over wider geographical area.

» Basic components include a host computer which is linked to sub-ordinate computers.

» Communication channels between machines are usually furnished by a third party.

» Typically operate at lower link speeds.

» Channels are of relatively low capacity and relatively error prone.

What is meant by network topology? What are different topologies or structures available?

a. The geometrical arrangement of computer resources, remote devices, and communication facilities is known as network structure or network topology.

b. Following are the <u>most commonly</u> used network topologies:

- Mesh topology / Mesh form of Network.
- Star topology / Star form of Network
- Bus topology / Bus form of Network
- Ring topology / Ring form of Network

Write about Mesh form of Network?   *(M13-4M)*

MEANING:

» It may be <u>fully connected</u> or connected with <u>only partial links</u>.

» In a fully <u>connected</u>, each node is connected by a <u>dedicated point to point link</u> to every node.

» In partially connected, <u>nodes</u> are <u>widely scattered</u>.

» A mesh network with 'n' nodes will have <u>$n(n-1)/2$ number</u> of <u>links</u> and the number of <u>links coming</u> from every node is (n-1).

» This concept is applicable to <u>wired and wireless networks</u>.
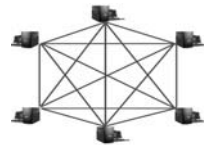
ADVANTAGES:

» <u>Highly reliable</u>.

» <u>Self-healing</u>

» If <u>one node fails</u>, network traffic can be <u>redirected</u>.

DISADVANTAGES:

» <u>More Cabling is</u> needed.

» Difficult to identify <u>network problems</u>.

» <u>Set-up and maintenance</u>is very difficult.

» <u>Adding or replacing a</u> node will <u>disturb the entire network</u>.

Write short notes on Star Network?
(N 08, 09, - 5M,M 11 - 4M, N 13 – 4M)

MEANING:

» This is the <u>most commonly</u> used structure or topology.

» It consists of <u>one central switch, hub or computer.</u>

» Each terminal or a small computer can communicate only with the <u>central site</u>, which acts like a <u>traffic controller</u>.

» To <u>transmit message</u> from one node to another, first sends data to the <u>hub</u>, in turn hub sends data to the destination.
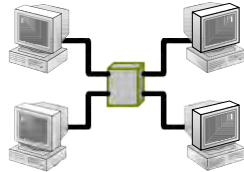
ADVANTAGES:

» <u>Easy to add</u> new nodes and <u>remove</u> nodes.

» A <u>node failure</u> does <u>not bring down</u> the entire network

» <u>Several users</u> can use the central unit at the same time.

» <u>Easier to diagnose</u> network problems

DISADVANTAGES:

» More dependence on <u>central hub</u>.

» It is <u>costlier</u> than other topologies.

» Network size is also limited.

Write about bus network?

MEANING:

» This is <u>very popular</u> for local area networks

» It is a <u>simplest way</u> to connect multiple clients.

» A set of clients are connected via a <u>shared communications line</u> called a <u>bus</u>.

» All <u>communications</u> should travel along a <u>bus</u>.

» It is a <u>decentralized approach</u>.

Terminator   **Trunk Line**

                                    Terminator
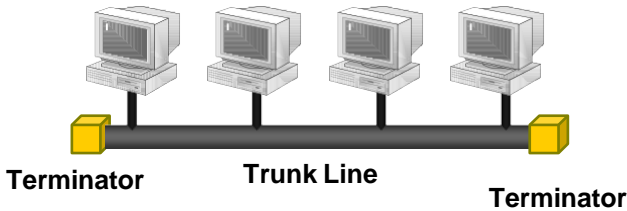
ADVANTAGES:

» Easy to <u>use and understand</u>.
» <u>Highly reliable</u> in small networks.
» Requires <u>least amount</u> of cable.
» <u>Less expensive.</u>
» Easy to <u>extend the network</u>.

DISADVANTAGES:

» <u>Heavy traffic</u> can slow down the network.
» Each <u>new connection</u> weakens the signal.
» <u>Difficult to troubleshoot</u> bus network.
» There is a problem with <u>main cable</u>, the <u>entire network</u> goes down.
» <u>Maintenance costs</u> may be higher in the long run.

Write about Ring form of Network?   (N 09 - 5M, N 12 – 4M)

MEANING:

» It is a <u>decentralised</u> network topology used for LANs

» In this topology, the <u>cable passes</u> from one node to another until all nodes are connected in the form of a <u>loop or ring.</u>
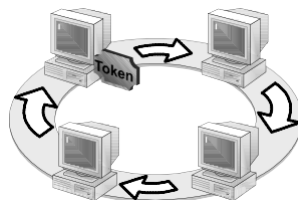
» Direct point-to-point links between two neighboring nodes.

» These links are unidirectional.

ADVANTAGES:

» Reliable

» Offers high performance for a small number of workstation

» Do not require a central computer to control activity.

» Spread over longer distances.

» Easy to expand.

» Performs better than star topology under heavy network load

DISADVANTAGES:

» Expensive and difficult to install.

» Failure of one computer can affect the whole network.

» Difficult to trouble shoot

» Adding or removing nodes can disturb the network.

Write about Transmission Technology (Or) Write about Serial and Parallel Transmission.   (M 06 - 4M, N 12 - 4M)

TRANSMISSION TECHNOLOGY: Data transmission on a communication channel between two machines can occur inseveral different ways :Serial and parallel

SERIAL TRANSMISSION:

• It is the most commonly used method of communication.

• In this method serial transmission bits of each byte are transmitted one after the other along a single path.
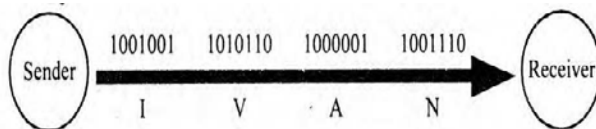
- Then the receiver assembles the incoming bit stream into characters
- An example is the serial port, used for Mouse or MODEM.
- Serial transmission can occur in any of the two ways - Asynchronous & Synchronous transmission.

Advantages:

- Less expensive mode of transferring data.
- Suitable to transmit data over long distances.

Disadvantage: It is not efficient (i.e. slow)

PARALLEL TRANSMISSION:

- in this method all the bits of each byte are transmitted simultaneously i.e. each bit will have a unique channel dedicated to it.
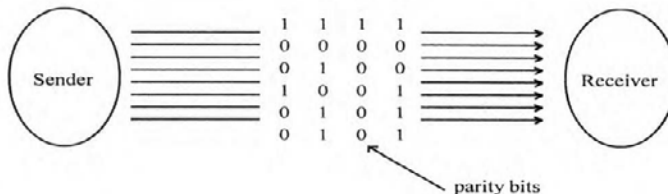
- For ASCII character we need eight channels.
- All bits are transmitted together and arrive at the destination together.
- Example - Parallel port being used for printers.

Advantages:

- Data can be transmitted at a very high speed.

Disadvantage:

- Not suitable for long distances.
- Costly.

> **Write about Synchronous and Asynchronous methods of data transmission.   (M 03, 05 - 4M, N 07, 11 - 4M)**

- Two basic ways of transmitting <u>serial binary data: synchronous and asynchronous</u>.

SYNCHRONOUS TRANSMISSION: (N 10 - 2M)

- Data bytes are sent <u>one after the other at regular intervals</u>.
- The data form a <u>continuous stream of bits</u> spaced at equal intervals, preceded and followed by <u>control characters</u>.
- The transmission and receiving intervals are precisely timed, allows grouping of bits into identifiable characters.
- It is mainly <u>used for computers</u> but is also used for human operation of <u>buffered terminals</u>

sync byte		message		sync byte
↓		↓		↓
00000000	10010011	10101100		.11111111
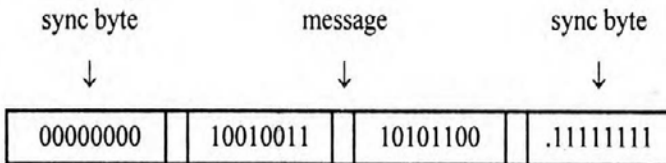
ASYNCHRONOUS TRANSMISSION: (N 03 - 1M, M 11 – 2M)

- Each character is <u>transmitted separately</u> i.e. one <u>character at a time</u>.
- The character is <u>preceded by a start bit</u>, which tells the receiving device where the character coding begins and is followed by a <u>stop bit.</u>

Start bit	byte	Stop bit	Start bit	byte	Stop bit	idle
↓	↓	↘	↙	↓	↓	↓
0	10010011	10		10101100	1..	111..
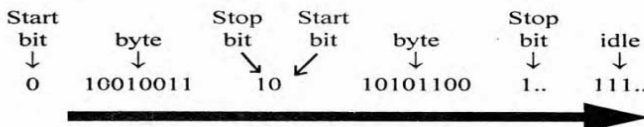
- Then the next character is sent, start bits first, character bits next, stop bits last.

- The start and stop bits allow the receiving and sending computers to synchronise the transmission.
- This is used for operation of <u>interactive computer terminals and teletypewriters.</u>

Write about different modes of data communication (Or) Transmission modes?
(N 98 - 6M, N 06, M 00, 02 - 5M, M 07 - 4M, M 12 - 4M, N 13 – 3M)

- It determines the <u>flow of direction of data</u> from one <u>system to another system</u> in a <u>communication network</u>.
- There are three different <u>transmission modes</u>.

a) Simplex:

- In this mode data is transmitted in <u>one direction only.</u>
- A terminal connected to such line may <u>send only or receive only</u>.
- The <u>sending station cannot receive data.</u>
- <u>For ex:</u> computer to printer.

b) Half duplex (alternating connection or semi-duplex):

- It allows data can be transmitted in <u>both the directions</u> but <u>only one side at a time</u>.
- Here every terminal <u>can send and receive</u> data but <u>only one activity</u> at a time.
- For example, <u>Walkie Talkie</u>.

c) Full duplex:

- It can <u>simultaneously transmit and receive</u> data between two stations.
- Full duplex line is faster.
- For example, <u>mobile phones</u>.

Write about Open System Interconnection.   (J 09 - 5M)

MEANING:

» OSI or the Open System Interconnection model designed by International Standards Organization (ISO) for Standardization.

» It provides communication of heterogeneous hardware or software platforms with each other.

Layers:

• **Physical Layer** is a hardware layer which specifies mechanical & electromagnetic features.

• **Data Link Layer** is also a hardware layer which specifies channel access control method.

• **Network Layer** makes a choice of the physical route of transmission of data.

• **Transport Layer** ensures reliable transfer of data between user processes, assembles and disassembles message packets, provides error recovery and flow control.

• **Session Layer** establishes, maintains and terminates sessions between user processes. Identification and authentication are undertaken at this layer level.

• **Presentation Layer** controls on screen display of data, transforms data to a standard application interface. Encryption, data compression can also be undertaken.

• **Application Layer** provides user services by file transfer, file sharing, etc. Database concurrency and deadlock situation controls are undertaken at this layer.

Write short notes on TCP/IP.   (N 07, 09 - 5M, N 10 - 1M)

MEANING:

a) The <u>protocol used</u> on the <u>Internet is</u> called <u>TCP/IP (Transmission Control Protocol/Internet Protocol)</u> or <u>internet protocol suite</u>

b) It consists of <u>five levels or layers of protocols</u>.

c) It is used by the <u>Internet</u> and by all <u>Intranets and extranets</u>

d) <u>Five levels</u> of <u>TCP/IP</u> are

   » **Application Layer:** <u>Pr</u>ovides services to the users such as <u>e-mail</u>.

   » **Transport Layer:**   Provides end-to-end <u>communication between applications.</u>

   » **Internet Layer:** Provides <u>packet routing</u> for error checking, <u>addressing and integrity</u>.

   » **Network Interface and physical Layers:** Provides an <u>interface</u> to the network <u>hardware.</u>

Steps in transmission of data:

» The TCP protocol breaks it up into <u>small packets.</u>

» Each packet consists of <u>destination address</u>.

» The packets are then <u>sent individually</u> over the Internet.

» The IP protocol guides the packets to <u>reach proper destination</u>.

Explain the threats involved in system security?   (M 08 - 4M)

THREAT:

- A <u>threat is</u> anything that can <u>disrupt the operation</u>, functioning, <u>integrity or availability</u> of a network or system.

- <u>Network security threats</u> can be <u>categorized into following four broad</u> themes:

a. Unstructured threats:

- These originate mostly from inexperienced individual's using easily available hacking tools from the Internet.

- Many tools available on the Internet can be used to discover weaknesses such as port-scanning tools, address-sweeping tools and many others.

b. Structured threats:

- These originate from individuals who are highly motivated and technically competent.

- Usually, these hackers are hired by organized crime, industry competitors, or state-sponsored intelligence organizations.

c. External threats:

- They originate from individuals or organizations working outside an organization.

- They usually work their way into a network from the Internet or dialup access servers.

d. Internal threats:

- They originate from individuals who have authorized access to the network.

- It may come from a discontented former or current employee or contractor.

Explain the vulnerabilities involved in system security?
(M 08 - 4M)

VULNERABILITY:

a. Vulnerability is an inherent weakness in the design, configuration or implementation of a network or system that renders it susceptible to a threat.

b. The following facts are responsible for <u>occurrence of</u> <u>vulnerabilities</u> in the software:

- **Software Bugs:** Software bugs are so common that users have <u>developed techniques to work around the</u> <u>consequences.</u> For example - buffer overflow

- **Timing Windows:** This problem may occur when a <u>temporary file is exploited</u> by an intruder to gain access to the file, <u>overwrite important data</u> and <u>use the same file as a</u> <u>gateway</u> for advancing further into the system.

- **Insecure default configurations:** They occur when <u>vendors use known default passwords</u> to make it as easy as <u>possible for consumers</u> to set up new systems.

- **Bad Protocols:** Some protocols or the standards, by which <u>information is exchanged</u> over the Internet, <u>may lack</u> <u>any security at all</u>.

- **Trusting Untrustworthy information:** This is usually a problem that<u> affects routers</u> or those computers that <u>connect one network to another.</u>

- **End users:** Generally, <u>users of computer systems</u> are <u>not</u> <u>professionals</u> and are not always <u>security conscious.</u>

Discuss FCAPS model of network management   (M 08 - 4M)

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1. <u>FCAPS</u> is the <u>ISO Telecommunications Management Network</u> <u>model</u> and <u>frame work</u> for network management.

2. It is an <u>acronym</u> for **Fault, Configuration, Accounting,** **Performance and Security.**

  a. Fault Management:

  - A <u>fault is an event</u> that has a <u>negative significance</u>.

  - The <u>goal</u> of fault management is to <u>recognize, isolate,</u> <u>correct and log faults</u> that occur in the network.

b. **Configuration Management:** <u>Monitors network and system</u> configuration information so that the impact on network operations can be <u>tracked and managed</u>.

c. **Accounting Management:** <u>Accounting management</u> is concerned with <u>tracking network utilization information</u>.

d. **Performance Management:** It measures and makes <u>network performance</u> such as <u>throughput</u>, <u>response times</u>, <u>packet loss</u> rates, <u>link utilization</u>, <u>error rates</u> and so forth.

e. **Security Management:** Security management functions include <u>managing network authentication</u>, <u>authorization, and auditing</u>, such that both <u>internal and external users</u>.

What are the functions of network management?

<u>Functions that are performed</u> as part of <u>network management</u> accordingly include

- Controlling

- Planning

- Allocating

- Deploying

- Monitoring the resources of a network

- Frequency allocation

- Cryptographic distribution authorization

- Configuration management

- Fault management

- Security management,

- Route analytics

- Accounting management.

Write about Intrusion Detection System (IDS)? Explain Primary IDS technologies?

MEANING: The goal of intrusion detection system (IDS) is to monitor the <u>network assets, to detect anomalous behavior and misuse.</u>
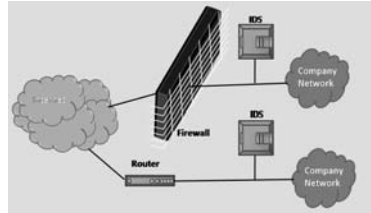
PRIMARY IDS TECHNOLOGIES:

Components of IDS:

1. **Network Intrusion Detection (NID):**
   - » Deals with <u>information</u> passing <u>in the wire</u> between hosts referred to as <u>packet-sniffers</u>.
   - » It <u>intercepts packets</u> traveling in <u>different communication channels</u>.
   - » Some devices will <u>simply compare</u> the packet with a Database consisting of known attacks and <u>malicious packet "fingerprints"</u>,

2. **Host-based Intrusion Detection (HID):**
   - » Designed to <u>monitor, detect & respond to user</u>, system activity &<u>attacks on a given host</u>.
   - » It is concerned with what occurs on the <u>hosts themselves</u>.
   - » Best suited to combat <u>internal threats</u>.
   - » Majority of computer <u>threats</u> come from <u>within organization</u>.

3. **Hybrid Intrusion Detection:**
   - » It alerts from <u>both network</u> and <u>host-based intrusion</u> detection devices.
   - » Hybrid solutions provide the <u>logical complement to NID and HID</u>.

4. **Network-Node Intrusion Detection (NNID):**
   - » Network-node <u>pulls the packet</u>-intercepting technology from the wire & puts it on host.

» "Packet-sniffer" captures packets <u>after they reach</u> their <u>final destination</u> i.e. host.

» <u>Network-node</u> is simply <u>another module</u> that can attach to the HID agent.

» The major disadvantage is that it <u>only evaluates packets</u> addressed to the host.

What tools are available to protect the information in network against intrusion or misuse? (OR) What are various Network Security Techniques?   (N 02 - 5M, RTP)

Several tools are now available to <u>protect information and systems</u> unauthorized intrusion or misuse:

a. **Firewalls:**

- It is an effective means of <u>protecting the firm's internal resources</u> from <u>unwanted intrusion.</u>

- It acts as a <u>system or combination of systems</u> that enforces a <u>boundary</u> between more than <u>one networks</u>.

b. **Message authentication:** It makes sure that a message is really from whom it is <u>supposed to be</u> and that it has <u>not been tampered</u>.

c. **Site blocking:** It is a software-based approach that <u>prohibits access to certain web sites</u> that are deemed to be <u>inappropriate by management</u>.

d. **Intrusion Detection System (IDS):** IDS is to <u>monitor the network assets</u>, to <u>detect anomalous behavior and misuse.</u>

Write short notes on Internet

- The <u>Internet is</u> the <u>massive global system</u> that connects <u>computer networks around the world</u> together.

- Millions of private, public, academic, business and government networks worldwide connect with each other over the <u>internet to share</u> information, <u>resources and services</u>.

- It uses the <u>standard Internet protocol suite (TCP/IP)</u> to allow us to <u>connect to each other</u>.

- It has various <u>information resources</u> and <u>services</u>, such as the <u>web pages</u> of the World Wide Web (WWW), games, videos, images, e-mail, social networking, etc.

- The <u>Internet carries</u> information from <u>all streams</u> – <u>traditional</u> such as newspaper, <u>book</u> and other <u>print publishing</u> and <u>modern</u> such as blogging and <u>web feeds</u>.

Write short notes applications of internet?

Internet can be used as a very effective media for various applications such as:

- **E-Commerce:** <u>Electronic commerce transactions</u> between businesses and their <u>suppliers and customers</u> can also perform with <u>online web applications</u>.

- **Chat rooms:** This is <u>interactive software</u> that allows users to <u>communicate</u> with each other.

- **Bulletin Boards:** The Internet provides <u>bulletin board systems</u> formed and <u>managed by thousands</u> of special-interest <u>newsgroups</u>.

- **E-mail:** It is an electronic mail system in <u>Internet</u>. Each user will be given a <u>unique address</u>. With this user <u>can communicate</u> with any person in the world. Ex. Gmail, yahoo etc.

- **Searching:** Internet allows <u>gathering information</u> through <u>online services</u> using web browsers and search engines.

- **Knowledge base:** Internet is a <u>library</u> where <u>companies and establishments</u> provide information about their <u>products and services</u>.

- **Downloading Software and information:** Internet allows us to <u>download software</u> and <u>information files</u> and <u>accessing</u> databases.

- **Data Publishing:** Information can be either <u>forwarded</u> to a <u>specified address</u> or <u>stored in a particular place</u>.

Write about Intranets? Explain benefits and role of intranet in organization?(N 00 - 5M)

MEANING:

- An intranet is a network <u>inside an organization</u> among widely <u>dispersed</u> departments, divisions and regional locations.

- it provides an Internet-like environment <u>within the enterpris</u> main means for intra office communication.

- It is <u>protected by security</u> measures such as passwords, encryption, and firewalls.

ADVANTAGES:

- Reduced <u>information searching time</u>
- <u>Easier, faster</u> access to information
- <u>Sharing and reuse</u> of tools and information
- <u>up-to-date information,</u>
- <u>Collaborative,</u> group working is possible.
- <u>Reduced costs</u>

ROLE OF INTRANET IN ORGANIZATION:

The Business Value of Intranets: Intranet applications <u>support communications and collaboration</u>, business operations and management, web publishing, and Intranet management.

a. Communications and Collaboration:

- Intranets can <u>significantly improve</u> communications and collaboration within an enterprise.

- Examples includes :Using an <u>Intranet browser</u> and workstation to send and receive e-mail, voicemail, paging, and fax to communicate with others within the organization.

b. Web Publishing: The advantages ofdeveloping and publishing <u>hyperlinked multimedia</u> documents to hypermedia <u>databases accessible</u> on <u>World Wide Web servers</u> has moved to corporate intranets.

c. Business Operations and Management: Intranets are being used as the <u>platform for developing and deploying</u> critical business applications to support business operations and managerial decision making across the internetworked enterprise.

Write about Extranet?   (M 03, N 05 - 5M,M13-1M RTP)

DEFINITION:

- It is a <u>private network</u> that uses Internet protocol and public telecommunication systems to <u>securely share part of a business's</u> information or operations with suppliers, vendors, partners, customers or other businesses.

- It is part of company's intranet that is <u>extended to users</u> outside the company.

- It is the <u>Company's website</u> for its customers and vendors.

REQUIREMENTS:

- <u>Firewall</u> server management

- Issuance and use of <u>digital signature certificate</u>

- <u>Encryption</u> of messages;

USES/APPLICATIONS:

- Exchange large volumes of data using <u>EDI</u>.

- Share <u>product catalogues</u> exclusively with wholesaler or those "in the trade".

- Collaborate with other companies on <u>joint development efforts</u>.

- Jointly develop and <u>use training programs</u> with other companies.
- Share news of common interest exclusively with <u>partner companies</u>.

FIVE RULES OF THE EXTRANET:

- Be as flexible as the business
- Deploy in "Internet time"
- Protect the interest of the data owner
- Serve the partner as a customer
- Drive information to the decision-maker

What is e-commerce? Explain the benefits of E-Commerce application implementation?   **(N 02, 06, M 08 - 5M, RTP)**

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a. EC is <u>associated with</u> buying and selling of information, products & services via computer networks.

b. EC presents many benefits to individual organizations, consumers and society as a whole. Some of them are:

  - Buyers can get the required goods at <u>less cost.</u>
  - <u>Selling costs can be reduced</u>.
  - <u>Reduced time</u> to complete business transactions
  - <u>Creation of new markets</u>
  - <u>Easy entry into new markets</u>
  - <u>Better quality</u>
  - <u>Reduced inventories.</u>
  - <u>Reduced overhead costs.</u>
  - <u>Reduced delivery cost</u>
  - <u>Equal access to markets</u>
  - <u>Reduced advertising costs</u>.
  - <u>Equal access to new markets.</u>
  - <u>Easy access to new markets.</u>

Explain the risks involved in e- commerce?

The risks associated with e-Commerce are versatile. Some of the risks associated with e-commerce are:

- **Problem of anonymity:** There is need to identify and authenticate users in the virtual global market where anyone can sell to or buy from anyone, anything from anywhere.

- **Repudiation of contract:** There is possibility that the electronic transaction in the form of contract, sale order or purchase by the trading partner or customer may be denied.

- **Lack of authenticity of transactions:** The electronic documents that are produced in the course of an e-Commerce transaction may not be authentic and reliable.

- **Data Loss or theft or duplication:** The data transmitted over the Internet may be lost, duplicated, tampered with or replayed.

- **Attack from hackers:** Web servers used for e-Commerce may be vulnerable to hackers.

- **Denial of Service:** Service to customers may be denied due to non-availability of system as it may be affected by viruses, e-mail bombs and floods.

- **Lack of audit trails:** Audit trails in e-Commerce system may be lacking and the logs may be incomplete, too voluminous or easily tampered with.

Write about Mobile Commerce.   (RTP, M 11 - 2M, M13-4M)

MEANING:

» Mobile Commerce or M-Commerce is about applications and services that are accessible from Internet-enabled mobile devices.

» It is the method of buying and selling of goods and services through wireless handheld devices such as cellular phones, Personal Digital Assistants (PDAs), etc. It is also known as next generation e-commerce.

FAST TRACK MATERIAL IN INFORMATION TECHNOLOGY

FEATURES:

» It involves <u>new technologies, services </u>and <u>business models</u>.

» It is <u>quite different f</u>rom <u>traditional E-Commerce</u>.

» This technology is based on <u>Wireless Application Protocol (WAP)</u>.

FACILITIES:

» M-commerce enables users to access the Internet <u>without any wired connection</u>.

» The content delivery over wireless devices is <u>faster, more secure, and scalable</u>.

INDUSTRIES AFFECTED BY M-COMMERCE:

» **Financial services:** Financial services, which include mobile banking as well as brokerage services.

» **Telecommunications:** Service charges, bill payment and account reviews in telecommunications, can all be conducted from a handheld device.

» **Service/retail:** Consumers can place orders and pay for them on the move.

» **Information services**: They include the delivery of financial news, sports updates and traffic updates to individual mobile devices.

Define the Electronic Funds Transfer. State some examples of EFT systems in operation?   (J 09 - 5M)

ELECTRONIC FUNDS TRANSFER (EFT):   (RTP)

» EFT stands for <u>"Electronic Funds Transfer</u>".

» It represents the ways the business can <u>receive direct deposit </u>of all payments from financial institutions to the company's bank account.

» EFT is <u>fast and safe</u>.

» The payment mechanism moves money between accounts in a <u>fast, paperless way</u>.

» These are some examples of EFT systems in operation

AUTOMATED TELLER MACHINES (ATMS):

» These are specialized form of <u>Point of Sale Terminals</u>.

» Consumers can do their banking without the assistance of a teller.

» These machines are used with a <u>debit or EFT card</u> and a code, which is often called a personal identification number or "PIN."

» <u>ATM cards can be used</u> to get cash, or to make deposits, pay bills, or transfer funds from one account to another account electronically.

POINT-OF-SALE (POS) TRANSACTIONS:

» Some Debit or EFT cards can be <u>used for shopping</u> that allow the transfer of funds from the consumer's account to the merchant's account.

» To pay for a purchase, the consumer <u>presents an EFT card</u> instead of cheque or cash.

» Money is taken out of the consumer's account and put into the merchant's account <u>electronically</u>.

PREAUTHORIZED TRANSFERS:

» This is a method of <u>automatically depositing to or withdrawing</u> funds from an individual's account, when the account holder authorizes the bank or a third party (such as employer) to do so.

» For example, <u>consumers can authorize</u> direct electronic deposit of wages, social security, or dividend payments to their accounts.

TELEPHONE TRANSFERS:

» Consumers <u>can transfer funds from one account to another through telephone instructions</u> rather than traditional written authorization.

» The accounts being debited can be checking or savings, for example—or can order payment of specific bills by phone.

PART B - 1 MARK QUESTIONS DEFINITIONS

1. **Telecommunication Network:** A Telecommunication Network is a <u>collection of terminal nodes</u>, links and any intermediate nodes which are connected to enable <u>communication between the terminals</u>.

2. **Data Communication:** The transmission of data between <u>two or more separate physical sites</u> through use of a public and/or private <u>communications channels or lines</u>.

3. **Terminals:** Any <u>input or output device</u> such as Video Terminals, Microcomputers, Telephones, Office Equipment, Telephone and Transaction Terminals that <u>are used to transmit or receive</u> data.

4. **Telecommunication Control Software:** It consists of <u>programs</u> that <u>control and manage the functions</u> of telecommunication networks and include Telecommunication Monitors, <u>Network Operating Systems</u>, Network Management Components and <u>Communication Packages.</u>

5. **Broadcast Networks:** Data transmitted by one node is <u>received by many</u>, sometimes all of the other notes.

6. **Communication Protocols:**
   A protocol is a formal set of <u>rules for communicating</u>, including rules for timing of message exchanges, the <u>types of electrical connections</u> used by the communications devices, error detection, and means of granting access to <u>communication channels</u> and so on.

7. **LAN:** A Local Area Network (LAN) is a <u>group of computers and network devices</u> connected together, usually within the <u>same building, campus or spanned over limited distance</u>. It provides high speed data transfer and is relatively inexpensive.

8. **Work Station:** Workstations are normally intelligent systems, such as IBM PC. PCs load programs and data from server and do the processing on their own. Most common operating systems for workstations are UNIX and Windows NT.

9. **Twisted pair Cables:**

    - Twisted-pair wires or cables are similar to cables used for home and office telephone system.

    - Two insulated wires are twisted around each other. It is inexpensive and easy to install.

    - They can handle data communications with speed (up to 10 mbps) over limited distances.

10. **Coaxial Cables:**

    - Coaxial cables are commonly used to connect computers and terminals in a local area such as an office, floor, building or campus.

    - This cable is conventionally used for cable television network.

11. **Fiber Optic Cables:**

    - Fiber optic cables use light as the communication medium.

    - Fiber optic cables are light weight and can handle huge amount of data. Data is more secure in fiber optic networks.

12. **Radio Waves:** Radio waves are an invisible form of electromagnetic radiation that varies in wavelength from around 1 millimeter to 1,00, 000kms. These are commonly used transmission media in Wireless Local Area Networks.

13. **Micro Waves:** Microwaves are radio waves with wavelengths ranging from as long as 1 meter to as short as 1 millimeter or equivalently, with frequencies between 300 MHz and 300 GHz. Commonly used for communication, radar systems, radio astronomy, navigation and spectroscopy.

14. Terrestrial Microwave: Terrestrial microwave media uses the <u>atmosphere as the medium</u> through which to transmit signals, and is used extensively for high-volume as well as <u>long-distance</u> communication of <u>both data and voice</u> in the form of <u>electromagnetic waves.</u>

15. Infrared Waves: Infrared light is <u>used in industrial, scientific and medical applications</u>. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being <u>detected.</u>

16. Communication   Satellites:

- A satellite is some <u>solar-powered electronic device</u> that receives, amplifies, and retransmits signal.

- They are <u>used extensively for high-volume</u> as well as long-distance communication of <u>both data and voice.</u>

- It is <u>cost-effective method</u> for moving large quantities of data over <u>long distances</u>.

17. MAN:

- A Metropolitan Area Network (MAN) is some where <u>between a LAN and a WAN</u>.

- Sometimes MAN refers to a network that <u>connects systems</u> or local area networks within a metropolitan area.

- Cable television networks are best examples of MANs that <u>distribute television signals</u>.

18. WAN:

- WAN is a <u>digital communication system</u> which interconnects different sites, computers and user terminals that are spread over a wide area (a state, a country or even world wide).

- It is a <u>commercial data network</u> that provides <u>data communication services</u> for business and government agencies.

19. **VPN:** A VPN is <u>a private network</u> that uses a <u>public network to connect</u> remote sites or users together. VPNs can be one of two types: <u>Intranet-based and extranet based</u>.   **(M 09 – 1M)**

20. **Switched network:** In these networks, the data transferred from <u>source to destination</u> is routed through the switch node.

21. **Network Interface card:** <u>Network Interface Card (NIC)</u> is a computer hardware component that connects a computer to a computer network. It has additional memory for <u>buffering incoming and outgoing</u> data packets, thus improving the <u>network throughput</u>.

22. **MODEM:** A MODEM is a device that converts a <u>digital computer signal into an analog telephone signal</u> (i.e. it modulates the signal) and <u>converts an analog telephone signal into a digital computer</u> signal (i.e. it demodulates the signal) in a <u>data communication system</u>.   **(N 08, 12 – 1M)**

23. **Multiplexer:** A multiplexer is a communication processor that allows a single communication channel to carry simultaneous <u>data transmissions from many terminals.</u>
   (M 03, 08 – 1M, N 11 – 2M, N 13 – 1M)

24. **Front-end Communication processor:** These are <u>programmable devices</u> which <u>control the functions</u> of communication system.

25. **Protocol converters:** Protocol converters help to communicate data between<u>dissimilar components and computers</u>. For example it may be necessary to convert data from ASCII to EBCDIC.   **(M 12– 2M, N 13 – 1M)**

26. **HUB:** Hub is a <u>port-switching communication</u> processor. This allows for the <u>sharing of the network</u> resources such as servers, LAN workstations, printers, etc.   **(M 04, N 13 – 1M)**

27. **Switches:** Switch is a <u>communication processor </u> that makes connections between telecommunication circuits in a network so that a <u>telecommunication message</u> can reach its intended destination.   **(M 07, N 12 – 1M)**

FAST TRACK MATERIAL IN INFORMATION TECHNOLOGY

28. **Repeaters:** Repeater is a communication processor that boosts or amplifies the signal before passing it to the next section of cable in a network.   **(M 05, N 07 – 1M)**

29. **Bridges:** Bridge is a communications processor than connects numerous Local Area Networks (LAN). It magnifies the data transmission signal while passing data from one LAN to another.

30. **Gateways:** Gateway is a communication processor that connects networks and uses different communication architectures.   **(N 04 – 1M)**

31. **Routers:** Router is a communication processor that interconnects networks based on different rules or protocols, so that a telecommunication message can be routed to its destination.

32. **Serial Transmission:** In serial transmission bits of each byte are transmitted one after the other along a single path. Example –Serial port. It can occur in any of the two ways - Asynchronous & Synchronous transmission.

33. **Parallel Transmission:** In this all the bits of each byte are transmitted simultaneously i.e. each bit will have a unique channel dedicated to it. Example – Parallel port being used for printers.

34. **Circuit Switching:** Circuit switching is commonly found on our home phones.We place a call and either get our destination party or encounter a busy signal. we can not transmit any message. Asingle circuit is used for the duration of the call.

35. **Message Switching:** Some organizations with a heavy volume of data to transmit use message switching. The computer receives all transmitted data, stores it and whenever an outgoing communication line is available, forwards it to the receiving point.   **(M 11 – 2M)**

36. **Packet Switching:** It is a sophisticated means of maximizing transmission capacity of networks. This is accomplished by breaking a message into transmission units, called packets, and routing them individually through the network depending on the availability of a channel for each packet.   **(N 02 – 1M)**

37. **Bandwidth:** Bandwidth refers to a channel's information carrying capacity. It is usually measured in terms of bits per Second (bps).   **(N 03 – 1M)**

38. **Network Architecture:** Network architecture refers to the layout of the network, consisting of the hardware, software, connectivity, communication protocols and mode of transmission, such as wired or wireless.

39. **TCP/IP:** TCP / IP (Transmission Control Protocol / Internet Protocol) is a protocol used on the Internet. TCP/IP creates a packet-switching network. TCP deals with exchange of sequential data. IP handles packet switching and is used on the Internet.

40. **Server:** A server is one or more multi-user processors with shared memory providing computing, connectivity and the database services and the interfaces relevant to the business need.

41. **File Server:** It is a computer system used for the purpose of managing the files, servicing the network printers, handling network communications and other functions.

42. **Database Servers:** Database servers offer real potential for remote database access and distributed databases.

43. **Application Servers:** An application server is a server program that resides in the server (computer) and provides the business logic for the application program.

44. **Print Servers:** Print servers provide shared access to printers. Most LAN operating systems provide print service.

45. **Proxy Server:** A proxy server is designed to restrict access to <u>information on the Internet</u>.

46. **2 tier Architecture:** PC's are being connected to servers and the application intelligence is implemented on the client. Servers are mainly <u>database server</u>s which offer data on the server.

47. **3 tier architecture:**

- In 3-tier architecture, <u>application logic </u>is transferred from the client back to the server. :

- It has the <u>three tiers</u>: Client – tier, Application – Server – tier and Data-server-tier.

48. **Virus:** A <u>Vital Information Resources Under seize </u>is a malicious program that attaches itself to a legitimate program and penetrates into the <u>operating system.</u>

49. **Worms:** A computer worm is a <u>self-replicating computer program</u>. Worms are similar to viruses but they exist as separate and <u>independent programs.</u>

50. **Hackers:** Hackers attempt to gain <u>unauthorized entry </u>into a system by circumventing the access control mechanism of the system. They can do this either with <u>good or bad intention</u>.

51. **Analog Transmission:** Analog refers to the signal is <u>continuous and carried by a changing </u>wavelength (pitch) and amplitude (loudness). Analog information can be transmitted <u>directly or encoded </u>into digital bits.

52. **Physical security:** <u>Physical Security </u>is implemented to <u>protect the physical systems assets </u>of an organization like the personnel, hardware, facilities, supplies and documentation.

53. **Logical Security:** A Logical Security is intended to <u>control malicious and non-malicious </u>threats to physical security and malicious threats to <u>logical security </u>itself.

54. Site blocking: It is a software-based approach that <u>prohibits access to certain web sites</u> that are deemed to be <u>inappropriate by management</u>.

55. Intranet: An Intranet is a network <u>inside an organization</u> that uses <u>Internet technologies</u> such as web browsers and servers, <u>TCP/IP network protocols</u>.

56. Data Publishing: Data publishing is a new opportunity being provided by <u>Internet</u>. Information can be either forwarded to a <u>specified address</u> or <u>stored in a particular place</u>.

57. Extranet: Extranets are network links that use <u>Internet technologies</u> to interconnect the Intranet of a business with the Intranets of its customers, suppliers, or other business partners.

58. Network Security: Network security consists of network infrastructure, policies adopted by the network administrator to <u>protect the network</u> and the <u>network accessible resources</u> from <u>unauthorized access</u> and the effectiveness of these measures together.

59. Threat: A <u>threat</u> is anything that can <u>disrupt the operation</u>, functioning, integrity or availability of a network or system. Network security threats can be <u>categorized into following four broad</u> themes:

- Unstructured threats
- Structured threats
- External threats
- Internal threats

60. Vulnerability: Vulnerability is an <u>inherent weakness</u> in the <u>design, configuration or implementation</u> of a network or system that renders it susceptible to a <u>threat</u>.

61. Cryptography: Cryptography is the <u>practice and study</u> of techniques for secure communication in the presence of third parties. It deals with <u>encryption and decryption</u> of data.

62. Firewalls: Firewall is a device that forms a <u>barrier (fence)</u> between a secure and an open environment. It acts as a <u>system or combination</u> of systems that enforces a boundary between more than <u>one networks</u>.

63. **Electronic commerce:** It is the process of <u>doing business electronically</u>. It involves automation of a variety of business-to-business and business-to-customer transactions through reliable and secure connections.

64. **Mobile Commerce:** Mobile Commerce or m-Commerce is about the <u>explosion of applications</u> and services that are becoming accessible from <u>Internet-enabled mobile devices</u> such as cellular telephone and Personal Digital Assistants (PDAs).

65. **Internetwork Processors:** Telecommunication networks are <u>interconnected by special purpose communication</u> processors called <u>internetwork processors</u> such as switches, routers, hubs, bridges, <u>repeaters and gateways</u>.

66. **EFT:** <u>Electronic Funds Transfer (EFT)</u> represents the way the business can receive direct deposit of all payments from the financial institution to the company bank account. Some <u>examples</u> of EFT systems in operation are Automated Teller Machines (ATMs), Point-of- Sale (PoS) Transactions, Preauthorized and Telephone Transfers.

67. **Digital Subscriber Line (DSL):** DSL (Digital Subscriber Line) <u>reuses the telephone line</u> that connects to our house for <u>digital data transmission</u>. DSL is a <u>higher-bandwidth way</u> to use the local telephone line than to <u>send bits over a traditional telephone</u> call instead of a <u>voice conversation</u>.

PART C - DIFFERENCES

1. **Local Area Network (LAN) Vs. Wide Area Network (WAN)**

   (N 02 – 4M, N 05- 4M)

No.	Difference	Local Area Network	Wide Area Network
1.	Spread/ Coverage	It is restricted to a limited geographical coverage of few kilometers.	It spreads over nationwide or even worldwide

2.	Data transmission errors.	Fewer data transmission errors occur because the distance covered in less.	Error rate is more because the distance covered is more.
3.	Data transmission speed.	Typical transmission speeds in LAN'S are 0.1 to 10 MBPS.	Data transmission speed ranges from 180 to 9600 Bits per second
4.	How nodes are connected?	Computers, terminals and peripheral devices are usually connected with wires and coaxial cables.	There may not be direct physical connection between various computers.
5.	Cost of transmission.	The cost to transmit data in a LAN is negligible	Cost will be high
6.	Communication Mode	Communication may take place by a way of direct cabling.	Communication takes place by way of cables, satellites or microwaves.
7.	Security	Security is not that much important.	Security is very important

2. **Guided vs unguided Media.**

No	Guided Media	Unguided Media
1.	It is Media that provide a conduit from one device to another.	It consists of a means for the data signals to travel but nothing to guide them along a specific path.
2.	It uses a "cabling" system that guides the data signals along a specific path.	It passes through a vacuum; it is independent of a physical pathway.
3.	Example – Coaxial Cable, Twisted Pair, Fiber Optic Cable.	Example – Infrared Waves, Micro Waves, Radio Waves etc.

3. Star Network Vs. Ring Network.   (N 01, 06 - 5M, N 04 - 4M)

No.	Star Network	Ring Network
1.	Here all nodes are connected to a central computer/hub through dedicated cables.	Here all nodes are connected in the form of a circular chain.
2.	Communication takes place between the nodes through the hub/computer only.	Communication takes place by each node to receive and check for the message.
3.	A broken connection between hub/central computer and node does not affect the rest of the network.	A broken connection between nodes leads to failure of entire network.
4.	Failure in the hub/central computer affects all nodes connected to that hub.	Failure in one node does not affect the entire system.
5.	The signal becomes weak when it has to travel long distances. To avoid it, repeaters are required to be used.	Repeaters are not needed. Every computer acts as a repeater.
6.	It is very easy to add/remove a node from the network.	It is difficult to add/remove a node from the system.

4. Ring Network Vs Mesh Network.   (M - 06)

No.	Mesh Network	Ring Network
1.	In this structure, there is a random connection of nodes using communication links.	In this topology, the network cable passes form one node to another until all nodes are connected in the form of loop or ring.

2.	A mesh network may be fully connected or connected with only partial links	There is direct point to point link between 2 neighboring nodes and these links are unidirectional.
3.	The reliability is very high as there are always alternate paths available if direct link between two nodes is down.	Ring network can span longer distances than other types of network
4.	Network problems are easier to diagnose	Adding or removing computers can disrupt the network.
5.	Cost of installation and maintenance is high.	They offer high performance for a small number of workstation or for larger networks where each workstation has similar work load.
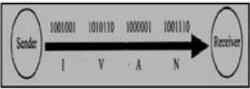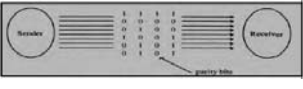
5. Client server architecture Vs Peer to Peer Architecture.

(N 04, 09 – 4M)

No	Client Server	Peer- to- Peer
1.	A client computer typically communicates only with servers, not with other clients.	Every computer is equal and can communicate with any other computer on the network to which it has been granted access rights.
2.	A central server handles all security and file transactions.	Each machine shares its own resources and handles its own security.
3.	It is more expensive as it requires a central file server, server software and client licenses.	It is relatively less expensive as it does not require a dedicated machine, server software or special client licenses.

4.	Backup is centralized on the server; managed by network administrator. Backup by device and media only required at server.	Backup is decentralized: managed by users. Backup devices and media are required at each workstation.
5.	The performance is relatively high as the server is dedicated and does not handle other tasks.	The performance is relatively low.
6.	In case of failure of server, the whole network fails.	No single point of failure in the network.
7.	C/S model relies on the power and stability of a single computer ie, Server.	P2P gives each workstation equivalent capabilities and relies heavily on the power and bandwidth of each individual computer.
8.	Example – Email, network printing, and the World Wide Web.	Example – Napster, Gnutella, Freenet, Bit Torrent and Skype.

6. Serial Transmission Vs. Parallel Transmission.

No.	Serial Transmission	Parallel Transmission
1.	In this, the data bits are transmitted serially one after another.	In this, the data bits are transmitted simultaneously.
2.	Data is transmitted over a single wire and is thus relatively slower.	Data is transmitted over eight different wires and is thus relatively faster.
3.	It is a cheaper mode of transferring data.	It is relatively expensive mode of transferring data.
4.		

5.	It is useful for long distance data transmissions.	Not practical for long distance communications.

7. **Synchronous Transmission Vs. Asynchronous Transmission.**

No.	Serial Transmission	Parallel Transmission
1.	Allows characters to be sent down the line without Start-Stop bits.	Each data word is accompanied with start and stop bits.
2.	The synchronous device is more expensive.	It is relatively cheaper.
3.	Chances of data loss are relatively higher.	More reliable as the start and stop bits ensure that the sender and the receiver remain in step with one another.
4.	It is more efficient.	It is relatively less efficient.

8. **Internet Vs. Intranet.**   **(M 02 – 4M)**

No.	Internet	Intranet
1.	The Internet is a global network of computer networks that are formed by various educational, commercial, Government, non-profit and military organizations.	Intranet is a type of information system that facilitates communication within the organization.
2.	This is not being developed and controlled by a single person or organization.	It is developed and controlled by private individuals and organizations.

3.	Internet is a public network. So, anybody can log into the network and perform any action at his choice.	It is a private network and access to private individuals is restricted by user names and passwords.
4.	Thousands of databases exist which can be accessed and used by private individuals.	Only authorized persons are allowed to access the data available in organization's databases.
5.	An internet can be defined as a network of networks.	An intranet can be a LAN or WAN that belongs exclusively to a corporation.
6.	Any node can transmit a message to any other node, along with communication channels, via the intermediate nodes. Internet uses provides Communication, Data Retrieval, Data publishing, etc.	Several applications of Intranet include: **a.** Supplier management **b.** Inventory management **c.** Distribution management **d.** Channel management
7.	Acts as an information service to retrieve the information worldwide.	Acts as an information service to retrieve and share files within the organization.

9. Firewall Vs. Encryption.

No.	Firewall	Encryption
1.	They control the flow of traffic between the Internet and the firm's internal LANs and systems. They are setup to implement the	This allows information to transit the Internet while being protected from interception. There are two basic approaches to

	security policies desired by the organization.	encryption: Hardware encryption and Software encryption.
2.	It is software oriented.	It is both hardware and software oriented.
3.	Controls the flow of traffic between the Internet and the firms internal LANS and systems.	It protects the information transmitted through Internet from eavesdroppers.
4.	It is defined based on specific security policies of the organisation.	It is a generalized policy with reference to information transmission.
5.	It is an effective means of protecting the firm's internal resources from unwanted intrusion.	Restricts the tampering of information from interception while in transmission.
6.	May be established for the entire LAN or for a specific application.	It will be application specific.

10. Centralized Processing Vs. Distributed Processing.

(N99 – 5M, N03 – 4M, M06 – 5M)

No.	Centralized Processing	Distributed Processing
1.	It refers to an environment consisting of a large mainframe computer system that supports multiple users and multiple application programs.	Distributed processing seeks to spread the computing needs across the organization.
2.	Users can access computer resources via hundreds of remote communication devices including on line terminals used to input data and printers to obtain reports.	In distributed processing the individual computers are tied together through a high-speed data communication network.

3.	Highly skilled, technically trained specialists are required to operate the system.	People with functional knowledge can also manage the system.
4.	This mode of processing is comparatively cheap. It also offers better control and protection of data.	This mode of processing incurs more expense with limited security, controls and protection of data.
5.	Can work effectively in small organizations.	Suitable even for big organizations.
6.	Generally, a dumb terminal will be allotted to each employee.	Generally, an intelligent terminal will be allotted to each employee.
7.	If the central computer fails, the entire network stops performing.	Even if the central computer fails, the network continues to function.

11. Virus Vs. Worms.

No.	Virus (May 1999, Nov 2001)	Worms
1.	Viruses are self-replicating program code that are inserted into other executable code.	Worms are destructive programs that may destroy data or utilize computer and communication resources by duplicating themselves.
2.	They may lie dormant for some time before getting triggered by certain events or occurrences, such as a date or on being copied at a pre-	Worms run independently and travel from machine to machine across network connections.

	specified number of times.	
3.	They are not capable of self-actuating.	They are self-actuating and self-sustaining.

12. Differentiate Host Based & Network Intrusion Detection System.

	Host Based Intrusion Detection System	Network Based Intrusion Detection System
Deterrence	Strong deterrence for insiders	Strong deterrence for Outsiders
Detection	Strong insider detection, weak outsider detection	Strong outsider detection, weak insider detection
Attack Anticipation	Good at trending and detecting suspicious behavior patterns	None
Damage Assessment	Excellent for determining extent of compromise	Very weak damage Assessment capabilities
Response	Weak real-time response, good for long term attacks	Strong response against outsider attacks
Scope	Narrow in scope, monitors specific activities	Broad in scope
Dependency	Host dependent	Host independent.

THE END

4. BUSINESS INFORMATION SYSTEMS

PART A- FAST TRACK NOTES

What is Information System? Explain the components of Information system?

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a) Information System [IS]:

» It is a combination of people, hardware, software, communication devices, network and data resources that processes data and information for a specific purpose.

» It refers to the interaction between the processes and technology.

» In other words, Information System is a set of interrelated components working together to collect, retrieve, process, store and disseminate (distribute) information for the purpose of achieving objectives such as planning, coordination, analysis and decision making.

b) An Information system [IS] consists of four basic concepts/components/basic resources:

» **People:** Human resources consist of end users and IT specialists.

» **Hardware:** Hardware involves machines and media.

» **Software:** Software resources consist of programs and procedures.

» **Data:** Data resources includes data, model, and knowledge base

c) All components of information systems are mutually connected and cannot exist individually.

Write a short note on Business Information systems [BIS].

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a) It is defined as systems which integrate information technology, people and business.

b) It brings business functions and information modules together for establishing effective communication channels.

c) Useful for making timely and accurate decisions and in turn contribute to organizational productivity and competitiveness.

d) Used to manage and control the informational resource in better manner.

e) Depending upon the usage at different levels, information systems can be classified into the following categories:

» Transaction Processing Systems (TPS)

» Management Information Systems (MIS)

» Decision Support Systems (DSS)

» Executive Information Systems (EIS)

» Office Information Systems (OIS) or Office Automation System (OAS)

» Knowledge Work Systems (KWS)

What is information system? Explain its role in businesses.

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a) It is a system of computers, data and software which are used to process data and provide required information.

b) The backbone of _IS' is the World Wide Web, Internet, or within a business a Local Area Network (LAN), along with EDI, EIS, ERP, SCM, CRM, E-commerce and a host of others.

c) Some of the important <u>roles of information system</u>- other than cost reduction, waste reductions and increase revenues – in business are:

» <u>effective decision making</u>

» <u>gain edge in the competitive environment</u>

» execute <u>innovative ideas efficiently</u>

» easy to solve <u>complex and critical problems</u>,

» <u>Utilize knowledge</u> gathered through information system in day to day business operations.

» Helps to take <u>right decision</u> at the <u>right time</u>

Who uses Information Systems?

a) <u>Strategic Level:</u>

» These are senior managers or <u>Top-level managers</u> who hold the titles such as Chief Executive Officers, Chief Financial Officers, Chief Operational Officers, Chief Information Officers and Chair Person of the Board, President, Vice President and Corporate Head Managers, who take decisions that will affect the entirety of the organization.

» They set goals and direct the company to achieve them.

» These are <u>ultimately responsible</u> for the <u>performance of the organization.</u>

b) <u>Management Level:</u>

» These are <u>Middle Managers</u> who are in the levels below top managers and hold the job titles like General Manager, Regional Manager etc.

» Responsible for <u>carrying out the goals</u> set by <u>Top Management</u>.

c) <u>Knowledge Level:</u>

» These include <u>knowledge and data workers</u> who are selected, recruited and trained in a special manner.

d) <u>Operational Level:</u>

» These include <u>Operational Managers</u> or supervisors who are responsible for the daily management of the line workers who actually produce the <u>product or offer the service</u>.

Explain Knowledge Management System (KMS).

a) Any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the knowledge management process.

b) It treats the knowledge component of any organization's activities as an explicit concern reflected in strategy, policy, and practice at all levels of the organization.

c) There are two broad types of knowledge—**Explicit** and **Tacit.**

» **Explicit knowledge:** which can be formalized easily and as a consequence is easily available across the organization. For example – Online tutorials, Policy and procedural manuals.

» **Tacit knowledge:** it resides in a few often-in just one person and hasn't been captured by the organization or made available to others. Tacit knowledge is unarticulated (unspoken) and represented as intuition, perspective, beliefs, and values that individuals form based on their experiences. For example – hand-on skills, special know-how, employee experiences.

d) A Knowledge Discovery in databases system is a value-added intranet with facilities to search and identify captured knowledge, or identify experts who have the knowledge.

e) It helps us establish contact with the expert and have a dialogue with them. It will then capture and make available the transcripts of such discussions, whether they be on chat, e-mail or discussion forums.

Explain Transaction Processing System (TPS). Explain TPS attributes.

a) It is a <u>type of information system</u> that collects, stores, modifies and retrieves the <u>day-to-day data transactions</u> of an enterprise.

b) Also known as <u>transaction processing</u> or <u>real time processing.</u>

c) Some <u>examples</u> would be the one used in Airline Reservation Systems<u>, Railway reservation on by IRCTC, Banking Systems</u>, or the <u>Accounting system</u> etc.

d) These are designed to process transactions <u>instantaneously</u>.

e) TPS Attributes:

   » Access Control

   » Equivalence

   » High Volume Rapid Processing

   » Trustworthiness

What are Transactions Processing Qualifiers?

a) It is a type of information system that collects, stores, modifies and retrieves the day-to-day data transactions of an enterprise.

b) Transactions Processing Qualifiers are :

   » **Atomicity:** This means that a transaction is <u>either completed in full or not at all</u>. TPS systems ensure that transactions take place in their entirety.

   » **Consistency:** TPS systems exist within a set of <u>operating rules or integrity constraints</u>. If an integrity constraint states that all transactions in a database must have a positive value, any transaction with a negative value would be refused.

   » **Isolation:** Transactions must appear to take place in <u>isolation or individual</u>.

   » **Durability:** Once transactions are completed they cannot be undone. To ensure that this is the case even if the <u>TPS suffers failure</u>, a log will be created to document all <u>completed transactions.</u>

What is Management Information System (MIS)?

1. It is an <u>integrated, user-machine system</u> for providing <u>information to support operation</u>, management and decision-making functions in an organization.

2. It is a system which provides <u>accurate, timely and meaningful data</u> for <u>management planning, analysis</u> and <u>control to optimize</u> the growth of the organization.

3. It refers to the data, equipment and computer programs that are used to develop <u>information for managerial use</u>.

4. It is an integrated information system that <u>serves all departments</u> within an enterprise.

5. While developing an integrated MIS system organization should follow certain steps:

a) Groundwork examination

1. The problem
2. Magnitude and scope
3. Alternatives
4. Feasibility and cost effectiveness

b) Requirements psychoanalysis

1. knowing the primary and secondary users
2. Ascertaining user needs
3. Primary and secondary sources of information
4. Design, development and implementation needs

c) Systems blueprint

1. Inputs
2. Processing
3. Outputs
4. Storage
5. Procedures
6. Human resources

d) Acquerement/ procurement

1. Compatibility
2. Cost effectiveness
3. Performance standards
4. After sales service
5. Configuration
6. Portability

Examples of MIS:

» Airline reservations - seat, booking, payment, schedules, boarding list, special needs, etc.

» Bank operations - Deposit, transfer, withdrawal etc. electronically with a distinguish payment gateways

» Integration of department with the help of contemporary software's like ERP

» Logistics management application to streamline the transportation system

» Train reservation with the help of IRCTC

What is meant by Decision Support System? Explain characteristics of a Decision Support System.

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1. Decision Support Systems (DSS):

a) Information processing systems frequently used by accountants, managers and auditors to assist them for decision-making purposes are called Decision Support Systems.

b) It is a computer-based information system that supports to business decision-making activities.

c) DSS covers a wide variety of systems, tools and technologies.

2. Characteristic features:

a) DSS supports management decision making: These are used by top level management for decision making purposes. These are also used by operational managers for management planning decisions. The system will recommend a particular alternative and the final decision is taken by the user.

b) Decision support systems solve unstructured problems: Problems that do not have easy solutions and problems in which some managerial judgment is necessary are called unstructured problems and such problems can be easily solved by DSS. An important characteristic of many decision support systems is that they allow users to ask what-if questions and to examine the results of these questions.

c) Friendly computer interface: Generally these are operated by managers and other decision makers, who are non-programmers. So these systems must be easy to use.

What are the components of a Decision Support System?

a) Users:
- » Usually, the user of a DSS is a manager with some <u>unstructured or semi-structured problem</u>. The manager may be <u>at any level of authority</u> in the organization (e.g. either top level or middle level or bottom level managers).

b) Databases:
- » Decision Support Systems include <u>one or more databases</u>.
- » These databases contain both <u>routine and non-routine</u> data from both <u>internal and external</u> sources.

c) Planning languages:
- » Planning languages can be either <u>general-purpose or special-purpose,</u> allowing users to perform routine tasks and specific tasks respectively.

d) Model base:
- » It is the ―brain‖ of the Decision Support System.
- » It <u>processes data</u> with the help of data provided by the user and the database.
- » There are <u>many types</u> of model bases, but most of them are custom developed models.
- » The planning language in DSS allows the user to maintain a dialogue with the model base.

What are the Benefits of DSS?

a) Improved decision quality	**d)** Improved communication
b) Cost reduction	**e)** Time saving
c) Increased productivity	**f)** Improved customer satisfaction

Write a short note on Executive Information Systems (EIS). Explain the EIS components.

a) It is a DSS that is designed to meet the special needs of <u>top-level managers</u>.

b) A <u>tool</u> that provides direct <u>on-line access</u> to relevant information in a useful and navigable format.

c) Supports <u>graphical displays</u> on an easy to use interface.

d) Provides rapid access to <u>timely information</u> and <u>direct access to management</u> reports.

e) Capable of accessing both internal and external data.

f) Provides extensive <u>online analysis tool</u> like trend analysis, market conditions etc.

g) Alternative names are <u>Enterprise Information System</u> or <u>Executive Support Systems (ESS).</u>

h) <u>Easy to use, present Information</u> in condensed view.

i) Access organization's databases and data external to <u>the organization</u>.

j) Components of EIS:
- » **Hardware:** Includes <u>Input</u> data-entry devices<u>, CPU,</u> Data Storage files and <u>Output Devices.</u>
- » **Software:** Includes <u>Text based software</u>, <u>Database</u>, and <u>Graphic types</u> such as time series charts, scatter diagrams, maps, motion graphics, sequence charts, and bar charts.

> » **User Interface:** Includes <u>hardware</u> and <u>software</u> components by which <u>users interact</u> with a machine. Several <u>types of interfaces</u> can be available to the <u>EIS structure</u>, such as menu driven, command language, natural language, and input/output.

> » **Telecommunication:** Involves <u>transmitting data</u> from one place to another in a <u>reliable networked system</u>.

What do you meanly by Office Automation Systems (OAS)? Explain benefits of Office Automation system.

a) Office Automation refers to the entire tools and methods that are applied to office activities which formulate to practice written, visual, and sound data in a computer-aided mode.

b) Office Automation refers to the <u>use of computer and software to generate</u>, collect, store, manipulate, and relay office information needed for accomplishing <u>basic tasks and goals</u>.

c) OAS is <u>combination of hardware, software,</u> and other resources used to smoothen the progress of communications and increase efficiency.

d) OAS uses new technologies to get a better working environment.

e) Office Automation is a <u>widespread appearance</u> that includes an all - embracing variety of applications of computer, communication and information technologies in office surroundings.

f) **Benefits:**
   » <u>Improves communication</u> within and between organizations.
   » <u>Accuracy</u> of Communication.
   » Reduces the cost <u>of communication</u>.
   » <u>Reduces the time</u>.

Write about Knowledge Discovery and Data Mining (KDD).

1. It deals with <u>ways and means of capturing</u> and making <u>obtainable knowledge</u> of the experts to others in electronic form.

2. They assist organizational employees to establish, contact, and communicate with experts on various subjects, or perhaps <u>even outside</u>.

3. Knowledge worker is a <u>key intellect</u> who is employed owing to his or her acquaintance of a subject matter, rather than their ability to perform manual labor.

4. It includes those in the information <u>technology fields</u>, such as computer programmers, systems analysts, technical writers or the people outside of information technology.

5. There are <u>confident factors</u> that show —why knowledge has gained so much momentum in recent times‖. These are:

   a) <u>**Altering Business surroundings:**</u> Previously the business environment used to be stable one, so the people of any organization naturally became <u>knowledgeable over time</u>. They absorbed and hang out knowledge about company's product & service, its market, customers, competitors and suppliers. But now rapid change means speedy knowledge obsolescence, so need is there to manage it before it <u>disappears without leaving a trace</u>.

   b) <u>**Burgeon Connections:**</u> Extremely <u>dispersed operations</u>, global expansion, continual change – none of these would have been possible if it was not possible to deploy knowledge officially and deliberately .Cheap computing has made it probable. IT is now translucent to the user and is more accomplished of capturing knowledge. The authentic, interactive networks can put knowledgeable people in stroke <u>through communication & technologies</u>.

c) Globalization: It's putting heaviness on firms for innovation as markets are at the present release for new-fangled players and competition is stiff. The scenery of goods and services has changed. Now companies have started selling knowledge in addition. For a research lab or software firm, not managing knowledge is similar to WalMart not managing inventory.

d) Modification in Organizational composition: In today's state of affairs, the organizational structures are changing. The new arrangement is that of —Virtual Organization‖. This composition is used to integrate far flung operations & Knowledge Discovery in Databases is required.

## Explain the Link between Information and Knowledge.

a) Information:

» Information touches all human action – it is repeatedly said that we survive in the ‗Information Age'.

» Information is an important resource to an organization.

» It represents an organization's tangible and intangible resources and all transactions relating to those resources.

» Information influences the way an organization operates.

» The right information, if it is delivered to the right person, in the right fashion, and at the right time, can improve and ensure organizational effectiveness and efficiency.

» The information system is the mechanism used to manage and control the information resource.

b) Knowledge:

» Knowledge is power.

» Knowledge is derived from information.

» Knowledge represents information with a potential use retained for reference in future decision situations.

» Information is necessarily subjective.

» Information must always be set in the context of its recipient.

» The same data may be interpreted differently by different people, depending on their existing knowledge.

Explain Enterprise Resource Planning (ERP).

a) ERP system is a fully integrated business management system, covering functional areas of an enterprise like Procurement, Inventory, Production, Sales, Logistics, Finance/Accounting and Human Resources.

b) It becomes a powerful tool for effective use of resources and to improve efficiency of an enterprise.

c) It promises one database, one application, and one user interface for the entire enterprise.

d) Makes the flow of information among all business functions in the internal boundaries of the organization and control the connections to external stakeholders.

e) ERP software provides competent and efficient administration, and automated business activities.

f) It is a complete software solution package for enhancing the performance in large organizations and meeting their requirements with ease and efficiency.
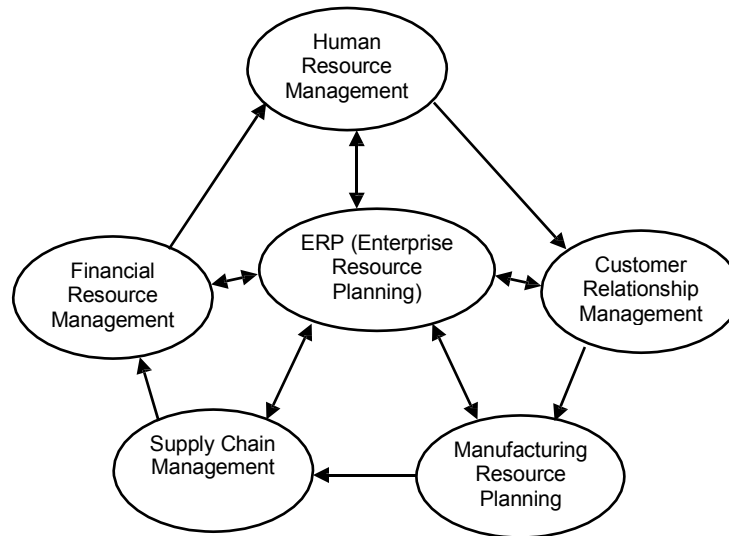
ERP linkages with various Modules

Define the term CRM. Explain CRM Architecture.

a) CRM includes the methodologies, technology and capabilities that help an <u>enterprise to manage customer</u> relationships.

b) It may be defined as a business process in which client relationships; customer loyalty and brand value are built through marketing strategies and activities.

c) Allows businesses to develop long-term relationships with established and new customers.

d) It integrates commercial and client-specific strategies via employee training, marketing planning, relationship building and advertising.

e) To be effective, the CRM process needs to be <u>integrated across marketing</u>, <u>sales and customer service.</u>

f) A good <u>CRM program</u> needs to:

» Identify customer success factors,

» Create a customer-based culture,

» Adopt customer-based measures,

» Develop an end-to-end process to serve customers,

» Recommend the questions to be asked to help a customer to solve a problem,

» Recommend what to tell a customer with some complaint,

» Track all aspects of selling to customers.

g) Architecture of CRM:

» **Operational:** Automation is provided to the <u>basic business processes</u> like marketing, sales, service, etc.

» **Analytical:** Helps to <u>analyze customer behavior</u>, implements business intelligence like technology, etc.

» **Collaborative:** Ensures <u>contact with customers</u> like phone, email, fax, web, SMS, post, in person, etc.

Explain Benefits of CRM.

a) CRM applications <u>smoothen the progress</u> to capture, consolidate, analysis, and enterprise-wide dissemination of data from existing and potential customers.

b) It as an <u>amalgamation of people</u>, process and systems rather than just IT application.

c) Some of the <u>benefits</u> are:

» Generating customer loyalty.

» Raising a market intelligence enterprise.

» Integrated relationship.

» Preserving existing customers.

» Providing enhanced services.

» The underlying standard that business exists in their customers.

» Developing connection and affiliation with customer.

Define Supply Chain Management.

a) SCM is the <u>process of planning, implementing and controlling the operations</u> of the supply chain with the purpose to satisfy customer requirements in an efficient way.

b) It covers <u>all movements and storage of raw materials</u>, work-in-process, and <u>finished goods</u> from <u>point-of-origin to point-of-consumption</u>.

c) It <u>integrates supply and demand management</u>, <u>within and across companies.</u>

d) A chain that starts with customers and ends with customers.

e) It is based on two central ideas.

» The first is that practically <u>every product that reaches</u> an end user represents the cumulative effort of multiple organizations. These organizations are referred to collectively as the <u>Supply Chain</u>.

» The second thought is that while supply chains have existed for a long time, most organizations have only paid attention to what was <u>happening within their —four walls.ll</u>

Explain the components of Supply Chain Management.

a) <u>Procurement/Purchasing:</u>

» It begins with the purchasing of <u>parts, components, or services</u>. Ensures that the <u>right items are delivered</u> in the exact quantities at the <u>correct location</u> on the specified <u>time schedule at minimal cost</u>.

» The key issue in procurement is how one goes about <u>selecting and maintaining</u> a supplier, which can be approached from <u>two directions</u>.

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b) Operations: Having received raw materials, parts, components, assemblies, or services from suppliers, the firm must transform them and produce the products or the services that meet the needs of its consumers.

c) Distribution:. Distribution involves several activities—transportation (logistics), warehousing, and Customer Relationship Management (CRM).

d) Integration: It is critical that all participants in the service chain recognize the entirety of the service chain.
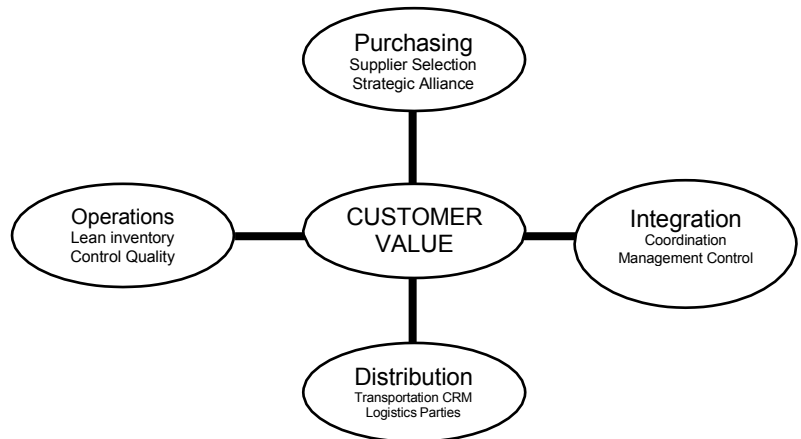

Core Elements of a Supply Chain Management Relationship

Explain Relationship between ERP, CRM and SCM.

a) CRM and SCM are two categories of enterprise software that are widely implemented in corporations and non-profit organizations.

b) While the primary goal of ERP is to improve and streamline internal business processes, CRM attempts to enhance the relationship with customers and SCM aims to facilitate the collaboration between the organization, its suppliers, the manufacturers, the distributors and the partners.
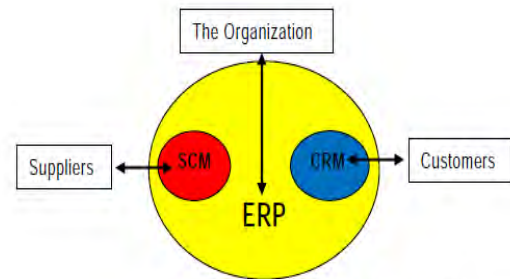
Relationship between ERP, CRM and SCM

c) SCM software chugs along, ensuring that materials and information flow through the supply chain with the highest possible efficiency and the lowest possible cost.

d) CRM software focuses on the identification, targeting, acquisition and retention of customers, and on the building of strong relationships between the business and its customers.

Explain Human Resource Management Systems (HRMS). Explain key integration points and benefits.

a) It is a software application that unites many human resources functions, together with benefits administration, payroll, recruiting and training, and performance analysis and assessment into one parcel.

b) HRMS or Human Resources Information System (HRIS) refers to the systems and processes at the intersection between Human Resource Management (HRM) and Information Technology.

c) **Key Integration Points:** HRMS uniquely provides indigenous integrations from HR Management to other core talent management processes in order to support a holistic, end-to-end cloud talent management strategy.

d) **Some of the key modules of HRMS.**

» Compensation Management   » Session Planning

» Recruitment & Hiring   » Work force management

- » Payroll & Benefits
- » Organizational Management
- » Training Management
- » Employee Self Service (ESS)
- » Personnel Management

e) Benefits:

- » Bringing industry best practices to the HR functions
- » HRMS lets you asses and utilize the human resource potential completely.
- » The solution increases the operational efficiency and productivity of the HR department.
- » Reduces HR administrative costs.
- » Increases employee engagement and satisfaction.
- » Improves leadership development and succession
- » Enhances data integrity within the enterprise
- » Enable to meet compliance and audit requirement.

Define Human Resource Management Systems (HRMS). Discuss its key modules

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a) It is a software application that combines many human resource functions together with benefits like administration, payroll, recruiting and training, performance analysis and assessment into one parcel.

b) Key Modules of HRMS are as follows:

- » **Workforce Management:** Workforce Management provides powerful tools to effectively manage labor rules, ensure compliance, and control labor costs and expenses.

- » **Time and Attendance Management:** The time and attendance module provide broad flexibility in data collection methods, labor distribution capabilities and data analysis features. Cost analysis and efficiency metrics are the primary functions.

- » **Payroll Management:** This module of the system is designed to automate manual payroll functions and facilitate salary, deductions, calculations etc.; eliminates errors and free up HR staff for more productive tasks.

- » **Training Management:** Training programs can be entered with future dates which allow managers to track progress of employees through these programs, examine the results of courses taken and reschedule specific courses when needed.

- » **Compensation Management:** Compensation Management is more than just the means to attract and retain talented employees.

- » **Recruitment Management:** This module helps in hiring the right people with the right target skills. This module includes processes for managing open positions, applicant screening, assessments, selection and hiring, correspondence, reporting and cost analysis.

- » **Personnel Management:** The personnel management module comprises of HR master-data, personnel administration, recruitment and salary administration.

- » **Organizational Management:** Organizational Management module includes organizational structure, staffing schedules and job description.

- » **Employee Self Service (ESS):** The Employee Self Service module allows employees to query HR related data and perform some Human Resource transactions over the system. For example - Employees may query their attendance from the system without asking the information from HR personnel.

Write about Core Banking System (CBS).

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a) **CORE** stands for "Centralized Online Real-time Environment".

b) Core banking systems are the heart of a bank. The absolute bank's branches access application from centralized data centers through which several facilities can be provided like- _24x7 customer service and support, Internet banking facility, global operations, real time transactions via ATM, Internet, mobile phone, and debit card'.

c) It may be defined as the set of basic software components that manage the services provided by a bank to its customers through its branches.

d) In other words, the platform where communication technology and information technology are merged to suit core needs of banking is known as Core Banking Solutions (CBS).

e) Normal core banking functions will include deposit accounts, loans, mortgages and payments. Banks make these services available across multiple channels like ATMs, Internet banking, and branches.

f) The various elements of core banking include:

   » Making and servicing loans

   » Opening new accounts

   » Processing cash deposits and withdrawals

   » Processing payments and cheques

   » Calculating interest

   » Customer relationship management (CRM) activities

   » Managing customer accounts

   » Establishing criteria for minimum balances, interest rates, number of withdrawals allowed

   » Establishing interest rates

   » Maintaining records for all the bank's transactions.

g) Examples of major core banking products include Infosys' Finacle, Nucleus FinnOne and Oracle's Flex cube application.

What is Accounting Information System (AIS)? Explain key components of Accounting Information System.

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a) AIS is defined as a system of collection, storage and processing of financial and accounting data that is used by decision makers.

b) It is generally a computer-based method for tracking accounting activity in combination with information technology resources.

c) The resulting statistical reports can be used internally by management or externally by other interested parties including investors, creditors and tax authorities.

d) **Key components of Accounting Information System**

   » People   » Software

   » Procedure and instructions   » Information technology Infrastructure

   » Data   » Internal controls


Define the term Artificial Intelligence? Write some of the applications of AI?

a) AI is the distinct area of computer science <u>focusing</u> on <u>creating machines</u> that <u>tries to imitate aspects</u> of <u>human behavior</u>, such as to <u>reason, communicate, see, and hear</u>.

b) AI software can use its <u>accumulated knowledge</u> to reason and in some instances learn from experience and thereby modify its <u>subsequent behavior</u>.

c) This is <u>manmade</u> and level of <u>activity depends</u> on the programming capability.

d) This is <u>not subject to human feelings</u> like fatigue, worry, etc.

e) The subject of artificial intelligence <u>spans</u> a wide horizon dealing with various kinds of <u>knowledge representation</u> schemes, different techniques of intelligent search, various methods for resolving uncertainty of data and knowledge, different schemes for automated machine learning and many others.

f) <u>Expert systems</u>, <u>Pattern recognition</u>, <u>Natural language processing</u>, and many others are some of the various purposes on which AI may be applied.

Write a short note on Expert Systems. (N 02)

<u>Meaning:</u>

a) An expert system (ES) is a <u>computerized information system</u> that allows <u>non-experts</u> to make <u>decisions comparable</u> to that of <u>an expert</u>.

b) Used for complex or unstructured <u>tasks</u> those require experience and <u>specialized knowledge</u>.

c) The <u>aim</u> of the expert system is to have a team of <u>experienced specialists</u> holding <u>industry-wide experience</u> who further spread across implementations.

d) Expert system has <u>leveraged</u> its strengths to <u>plan and execute</u> a miscellaneous variety of projects for Defense, Government, Finance, Telecom, and Engineering sectors.
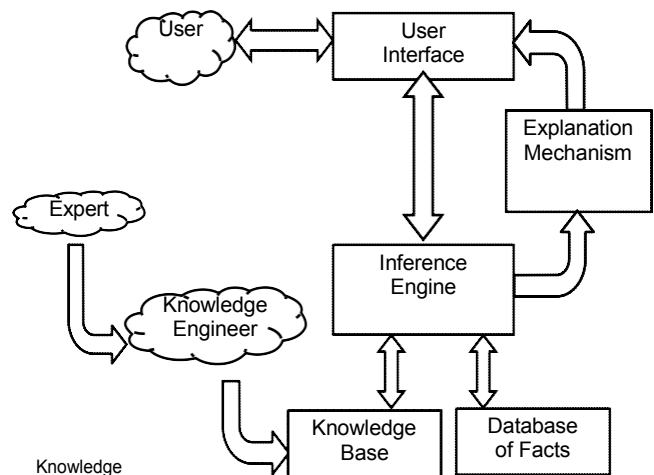
<u>Components:</u> Expert systems <u>typically contain</u> the following <u>c</u>omponents:

a) Knowledge base:

» This <u>includes</u> data, knowledge, relationships, <u>rules of thumb</u> (heuristics) and decision rules used by experts to <u>solve a particular type</u> of problem.

» A knowledge base in a computer is equal to the <u>knowledge of an expert</u> or group of experts developed <u>through years of experience</u> in their field.

» The knowledge base of expert systems encloses both <u>realistic and heuristic knowledge</u>.

» <u>Realistic knowledge</u> is that knowledge of the job domain that is extensively shared, characteristically found in textbooks or journals, and frequently agreed upon by those knowledgeable in the meticulous field

» <u>Heuristic knowledge</u> is the fewer rigorous, extra empirical, supplementary judgmental knowledge of performance.

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b) Inference engine: This program consists of <u>logic and reasoning mechanism</u> that can simulate the expert's logic process and deliver advice. It uses data obtained from <u>both knowledge base and the user</u> to make associations and inferences, form conclusions and recommend a course of action.

c) User interface: allows the <u>user to design, create, update, use and communicate</u> with the expert system.

d) Explanation facility: With this facility a user can know the <u>logic being</u> followed by the expert system to <u>arrive at the conclusion</u>.

e) Knowledge acquisition facility: Building a knowledge base, known as <u>knowledge engineering</u>, involves both human expert and a knowledge engineer. The <u>knowledge engineer</u> extracts an individual's expertise and uses the <u>knowledge acquisition facility</u> to enter it into <u>knowledge base</u>.

f) Database of Facts: This holds the user's input about the <u>current problem</u>. The user may begin by entering as much as they know about the problem or the inference engine may prompt for details or ask whether <u>certain conditions</u> exist. Gradually a database of facts is built up which the inference engine will use to <u>come to a decision</u>. The <u>quality and quantity</u> of data gained from the user will influence the <u>reliability of the decision</u>.

What are the advantages and disadvantages of Expert Systems?

<u>**Advantages:**</u>

a) Provide a <u>cost-effective alternative</u> to human experts.

b) They can <u>outperform a single expert</u> because their knowledge is gained from several experts.

c) They are <u>faster and more consistent</u> and do not get over worked or stressed out.

d) They produce <u>better-quality and more consistent</u> decisions.

e) They can <u>increase productivity</u>.

f) They <u>preserve the expertise</u> of an expert, leaving the organization.

<u>**Limitations:**</u>

a) Development can be <u>costly and time-consuming</u>. Some large systems require upto 15 years and millions of dollars to develop.

b) It is difficult to <u>obtain knowledge</u> from experts because it is very difficult to specify exactly how the decision maker has taken decision.

c) Designers were <u>unable to program</u> human being's common sense into current systems. If the system faces any situation, which is not programmed to handle, then the system may break down.

Write about credit card. What are the steps involved in credit card transaction?

<u>**Credit Cards:**</u> A **credit card** is a payment card issued to users as a system of payment. It allows the cardholder (consumer) to pay for goods and services based on the holder's promise to pay for them.

a) In a credit card transaction, the consumer presents <u>preliminary proof</u> of his ability to pay by presenting his credit card number to the <u>merchant</u>.

b) The merchant can verify this with the bank and <u>create a purchase slip</u> for the consumer to endorse.

c) The merchant then uses this <u>purchase slip</u> to collect <u>funds from the bank</u>, and, on the next billing cycle, the consumer receives a <u>statement</u> from the bank with a <u>record of the transaction</u>.

How a credit card is processed?

Step 1: Authorization: This is the first step in <u>processing a credit card</u>. After a merchant swipes the card, the data is submitted to merchant's bank, called an acquirer, to request <u>authorization</u> for the sale. The acquirer then routes the request to the card issuing bank, where it is authorized or denied, and the merchant is allowed to process the sale.

Step 2: Batching: This is the second step in processing a credit card. At the <u>end of the day</u>, the merchant reviews all the day's sales to ensure that all of them were <u>authorized and signed by the cardholder</u>. It then transmits all the sales at once, called a batch, to the acquirer to receive payment.

Step 3: Clearing: This is the third step in processing a credit card. After the <u>acquirer receives the batch</u>, it sends it through the card network, where each sale is routed to the appropriate issuing bank. The issuing bank then subtracts its interchange fees, which are shared with the card network and transfers the remaining amount through the network, back to the acquirer.

Step 4: Funding: This is the fourth and final step in processing a credit card. After <u>receiving payment</u> from the issuer, minus interchange fees, the <u>acquirer subtracts</u> its discount fee and sends the <u>remainder to the merchant</u>. The merchant is <u>now paid for the transaction</u>, and the cardholder is billed.

Write about electronic cheques.

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1. An electronic cheque has all the features as a <u>paper cheque.</u>

2. It acts as a message to the sender's bank to <u>transfer funds.</u>

3. Like a paper cheque, the message is first given to the receiver, who, in turn, endorses the cheque and presents it to the bank to <u>obtain funds.</u>

4. It is <u>superior to the paper cheque</u> in one significant aspect. The sender can protect himself against fraud by encoding the account number with the bank's public key. Thus it is not necessary to reveal the account number to the merchant.

5. <u>Digital certificates</u> can be used to <u>authenticate the payer</u>, the payer's bank, and the bank account.

6. Credit card payments will undoubtedly be popular for <u>commerce on the Internet</u>. However, following two systems have been developed to use electronic cheques to pay Web merchants directly**.**

    a) By the Financial Services Technology Corporation (FSTC):

      » The <u>FSTC is a consortium</u> of banks and clearing houses that has designed an electronic cheque.

      » Designed in the lines of traditional paper cheque, this new cheque is <u>initiated electronically.</u>

      » It uses digital signature for <u>signing and endorsing</u>.

    b) Cyber Cash:

      » This is an <u>extension of wallet</u> for credit cards, and it can be used in the same way to make payments with <u>participating vendors</u>.

      » It will not serve as an intermediate party for processing the cheque. That function will be handled <u>directly by banks</u>.

Define smart cards. Write about different types of smart cards available.

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1. <u>Smart Cards:</u>

a) Smart cards have an <u>embedded microchip</u> instead of <u>magnetic strip</u>.

b) The chip contains all the information a magnetic strip contains but offers the possibility of <u>manipulating</u> the <u>data</u> and <u>executing applications</u> on the card.

2. **<u>Types of smart cards:</u>** Three types of smart cards are available today. Those are

   » **Contact Cards:** Smart cards that need to <u>insert into a reader</u> in order to work, such as a <u>S</u>mart <u>C</u>ard <u>R</u>eader or <u>A</u>utomatic <u>T</u>eller <u>M</u>achines.

   » **Contactless Cards:** Contact less smart card <u>doesn't need</u> to be <u>inserted into a reader</u>. Just <u>waving</u> them near a reader is just sufficient for the card to <u>exchange data</u>. This type of cards is used for <u>opening doors</u>.

   » **Combi / Hybrid Cards:** Combi cards contain <u>both technologies</u> and allow a <u>wider range</u> of applications.

Write about Electronic purses.

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1. It is yet another way to make <u>payments</u> over the internet.

2. It is very similar to a <u>pre-paid card</u>.

3. For E.g. Bank issues a stored value cards to its customers. Customer can then transfer value from their accounts to the cards at an ATM, a personal computer, or a specially equipped telephone. The <u>electronic purse card</u> can be used as an ATM card as well as a credit card.

4. While making purchases, customers pass their cards through a vendor's point of sale terminal.

5. No <u>credit check or signature</u> is needed.

6. Validation is done through a Personal Identification Number (PIN)

7. Once the transaction is complete, funds are deducted directly from the card and transferred to the <u>vendor's terminal</u>.

8. Merchants can transfer the value of <u>accumulated transactions</u> to their bank accounts by telephone, as frequently as they choose.

9. When the value on a card is spent, consumers can <u>load additional funds</u> from their accounts to the card.

PART B- 1 MARK QUESTIONS DEFINITIONS

1. **Information:**

   » <u>Processing of data</u> is known as <u>information</u>

   » Data is a <u>raw fact</u> and can take the <u>form of a number or statement,</u> such as a date or a measurement, which has <u>some meaning</u>.

2. **System:**

   » The system is a <u>set of mutually related</u>, coordinated elements or components that operate together to <u>accomplish objectives</u> by <u>taking inputs</u> and <u>producing outputs</u> in an organized manner.

   » A system contains <u>several subsystems</u> with sub goals, all contributing to meet the overall system goal.

3. **Information System [IS]:**

   » An information system is a <u>set of interrelated components</u> working together to collect, retrieve, process, store and disseminate (distribute) information for the purpose of <u>achieving objectives</u> such as planning, coordination, analysis and decision making.

» IS refers to the <u>interaction</u> between the <u>processes and technology</u>.

4. **Knowledge Management System:**

» KMS refer to a system for managing knowledge in organizations for supporting creation, capture, storage and dissemination of information.

» It enables employees to have ready access to the organizations documented base of facts, sources of information and solutions.

5. **Explicit knowledge:** Explicit knowledge is that which can be formalized easily and as a consequence is easily available across the organization. For example – Online tutorials, Policy and procedural manuals.

6. **Tacit knowledge:** Tacit knowledge, resides in a few often-in just one person and hasn't been captured by the organization or made available to others. Tacit knowledge is unarticulated and represented as intuition, perspective, beliefs, and values that individuals form based on their experiences. For example – hand-on skills, special know-how, employee experiences.

7. **Transaction Processing System:**

» A **TPS** is a <u>type of information system</u> that collects, stores, modifies and retrieves the <u>day-to-day data transactions</u> of an enterprise.

» TPS systems are designed to process transactions <u>instantaneously</u> to ensure that customer data is available to the processes that require it.

» TPS is also known as <u>transaction processing</u> or real time processing.

8. **Atomicity:** Atomicity requires that each transaction is "<u>all or nothing</u>": if one part of the transaction fails, the entire transaction fails, and the database state is left unchanged. An atomic system must guarantee atomicity in each and every situation, including power failures, errors, and crashes.

9. **Consistency:** Consistent state means that there is no violation of any <u>integrity constraints</u>. If an integrity constraint states that all transactions in a database must have a positive value, any transaction with a negative value would be refused.

10. **Isolation:** Transactions must appear to take place in <u>isolation or individual</u>. Isolation requires that multiple transactions occurring at the same time not impact each other's execution.

11. **Durability:** Once transactions are completed they cannot be undone. To ensure that this is the case even if the <u>TPS suffers failure</u>, a log will be created to document all <u>completed transactions.</u> In other words, Durability means that once a transaction has been committed or saved, it will remain so, even in the event of power loss, crashes, or errors.

12. **Management Information System:**

» It is an <u>integrated, user-machine system</u> for providing <u>information to support operation</u>, management and decision-making functions in an organization.

» It is a system which provides <u>accurate, timely and meaningful data</u> for <u>management planning, analysis</u> and <u>control to optimize</u> the growth of the organization.

13. **Decision Support Systems (DSS):**

» It is a <u>computer-based information system</u> that supports business or organizational <u>decision-making activities</u>.

» These are frequently used by <u>accountants, managers and auditors</u> to assist them for <u>decision-making purposes</u>.

14. Model base:

» It is the —brainǁ of the Decision Support System.

» It processes data with the help of data provided by the user and the database.

» The analysis provided by model base is the key for user's decision.

15. Executive Information System:

» An EIS is a type of information system that facilitates and supports senior executive information and decision-making needs. It provides easy access to internal and external information relevant to organizational goals.

» It is commonly considered a specialized form of decision support system (DSS).

16. Office Automation Systems (OAS):

» Office Automation refers to the entire tools and methods that are applied to office activities which formulate to practice written, visual, and sound data in a computer-aided mode.

» The Office Automation Systems (OAS) is combination of hardware, software, and other resources used to smoothen the progress of communications and augment efficiency.

17. Knowledge management (KM): It is the process of capturing, developing, sharing, and effectively using organizational knowledge. It refers to a multi-disciplined approach to achieving organizational objectives by making the best use of knowledge.

18. Data mining or knowledge discovery:

» It is the process of analyzing data from different perspectives and summarizing it into useful information - information that can be used to increase revenue, cuts costs, or both.

» Data mining software is one of a number of analytical tools for analyzing data. It allows users to analyze data from many different dimensions or angles, categorize it, and summarize the relationships identified.

» Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.

19. Enterprise Resource Planning:

» An ERP system is a fully integrated business management system, covering functional areas of an enterprise like Procurement, Inventory, Production, Sales, Logistics, Finance, Accounting and Human Resources.

» It organizes and integrates operation processes and information flows to make optimum use of resources such as men, material, money and machine, i.e. ERP is the way an Enterprise plans the optimum use of its resources.

20. CRM:

» It includes the methodologies, technology and capabilities that help an enterprise to manage customer relationships.

» Allows businesses to develop long-term relationships with established and new customers, while helping to modernize corporate performance.

21. Supply Chain Management:

» SCM is the process of planning, implementing and controlling the operations of the supply chain with the purpose to satisfy customer requirements in an efficient way.

» It covers all movements and storage of raw materials, work-in-process, and finished goods from point-of-origin to point-of-consumption.

» It integrates <u>supply and demand management</u>, <u>within and across companies.</u>

22. Human Resources Management System:

» A HRMS is a <u>software application</u> that coalesce many human resources functions, together with benefits administration, <u>payroll, recruiting and training</u>, and <u>performance analysis</u> and <u>assessment into one parcel</u>.

» HRMS or Human Resources Information System (HRIS) refers to the <u>systems and processes</u> at the intersection between <u>Human Resource Management (HRM) and Information Technology.</u>

23. Core Banking System:

» **CORE** stands for <u>"Centralized Online Real-time Environment"</u>.

» Core Banking System may be defined as the <u>set of basic software components</u> that manage the services provided by a <u>bank to its customers</u> through its branches with the support of <u>communication technology</u> and information technology

» CBS is networking of branches, which enables Customers to operate their accounts 24x7, and avail banking services from any branch of the Bank on CBS network, regardless of where he maintains his account.

24. Accounting Information System:

» It is defined as a system of collection, storage and processing of <u>financial and accounting data</u> that is used by <u>decision makers</u>.

» It is generally a <u>computer-based method</u> for tracking <u>accounting activity</u> in combination with <u>information technology resources</u>.

25. Artificial Intelligence:

» AI is the distinct area of computer science focusing on <u>creating machines</u> that <u>tries to imitate aspects</u> of <u>human behavior</u>, such as to <u>reason, communicate, see, and hear</u>.

» AI software can use its accumulated knowledge to reason and in some instances learn from experience and thereby modify its <u>subsequent behavior</u>.

» <u>Expert systems</u>, <u>Pattern recognition</u>, <u>Natural language processing</u>, and many other areas where AI can be applied.

26. Expert Systems:

» An ES is a <u>computerized information system</u> that allows <u>non-experts</u> to make <u>decisions comparable</u> to that of <u>an expert</u>.

» These are used for <u>complex or unstructured tasks</u> that require experience and <u>specialized knowledge</u>.

27. Knowledge base:

» This <u>includes</u> data, knowledge, relationships, <u>rules of thumb</u> (heuristics) and decision rules used by experts to <u>solve a particular type</u> of problem.

» A knowledge base in a computer is equal to the <u>knowledge of an expert</u> or group of experts developed <u>through years of experience</u> in their field.

» The knowledge base of expert systems encloses both <u>realistic and heuristic knowledge</u>.

28. Credit Cards:

» A <u>credit card</u> is a plastic card issued by a financial institution that allows its user to borrow <u>pre-approved</u> funds at the point of sale in order to complete a purchase.

» Credit cards have a credit limit -- the user can borrow during a given period. The credit limit is pre-determined by the card issuer based on the cardholder's credit rating and credit history

29. Smart Cards:

» Smart cards have an embedded microchip instead of magnetic strip.

» The chip contains all the information a magnetic strip contains but offers the possibility of manipulating the data and executing applications on the card.

» Three types of smart cards are Contact cards, Contact-less and Hybrid cards.

30. Electronic purses:

» Electronic purse is very similar to a pre-paid card where funds can be directly deducted from the Card to vendor's POS terminal.

» When the value on a card is spent, consumers can load additional funds from their accounts to the card.

» Validation is done through a Personal Identification Number (PIN)

31. Business Intelligence:

» **Business intelligence** (**BI**) is a set of theories, methodologies, architectures, and technologies that transform raw data into meaningful and useful information for business purposes.

» BI, in simple words, makes interpreting voluminous data friendly. Making use of new opportunities and implementing an effective strategy can provide a competitive market advantage and long-term stability.

32. Business Information System: It is defined as system integrating business functions and information modules for establishing effective communication channels which are useful for making timely and accurate decisions and in turn contribute to organizational productivity and competitiveness.

33. Business Process: A Business Process is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a specific organization.

34. Extensible Business Reporting Language (XBRL): XBRL is freely available international standards-based business reporting language developed by accountants for financial reporting.

35. Online Analytical Processing (OLAP): OLAP is a multi-dimensional analytical tool typically used in data mining, that gathers and process vast amounts of information into useful packets.

PART C – DIFFERENCES

1. Data Vs. Information.   **(M 98 - 5M)**

No.	Data	Information
1.	Data is raw and unorganized fact that needs to be processed.	When data is processed, organized, structured or presented in a given context so as to make it useful, it is called Information.
2.	Data in itself is meaningless and is the lowest level of knowledge.	Information is the second level of knowledge.
3.	Observations and recordings are done to obtain data.	Analysis of data is done to obtain information.

2. Role-based Access Control (RBAC) Vs. Rules-based Access Control (RAC).

Role-based Access Control (RBAC):

1. RBAC largely eliminates discretion when providing access to objects. Instead, administrators or automated systems place subjects into roles.

2. Subjects receive only the rights and permissions assigned to those roles.

3. RBAC uses a centrally administered set of controls to determine how subjects and objects interact. When an employee changes jobs, all previous access is removed, and the rights and permissions of the new role are assigned.

4. RBAC enforces static constraints based on a user's role. It is the best system for an organization that has high turnover.

Rules-based Access Control (RAC):

1. RAC takes into account the data affected, the identity attempting to perform a task, and other triggers governed by business rules.

2. RAC uses specific rules that indicate what can and cannot happen between a subject and an object. A manager, for example, has the ability to approve his/her employees' hours worked.

3. However, when s/he attempts to approve his/her own hours, a rule built into the application compares the employee record and the user, sees they are the same, and temporarily removes approval privilege. It is not necessarily identity based.

3. Explicit knowledge Vs. Tacit knowledge.

Explicit knowledge:

1. Explicit knowledge is that knowledge which can be formalized easily and as a consequence is easily available across the organization.

2. Explicit knowledge is articulated, and represented as spoken words, written material and compiled data.

3. This type of knowledge is codified, easy to document, transfer and reproduce.

4. For example - Online tutorials, Policy and procedural manuals.

Tacit knowledge:

1. Tacit knowledge, on the other hand, resides in a few often-in just one person and hasn't been captured by the organization or made available to others.

2. Tacit knowledge is unarticulated and represented as intuition, perspective, beliefs, and values that individuals form based on their experiences.

3. It is personal, experimental and context specific. It is difficult to document and communicate the tacit knowledge.

4. For example - hand-on skills, special know-how, and employee's experiences.

4. Information Vs. Knowledge.   (N 03 – 4M)

No.	Information	Knowledge
1.	Information is piecemeal, fragmented and particular.	Knowledge is structured, coherent, and often universal.

2.	Information is timely, transitory, and may even be short-lived.	Knowledge is of enduring significance.
3.	Information is a flow of messages.	Knowledge is a stock, largely resulting from the flow, in the sense that the —input‖ of information may affect the stock of knowledge by adding to it, restructuring it, or changing it in any way.
4.	Information is acquired by being told.	Knowledge can be acquired by thinking. Thus, new knowledge can be acquired without new information being received.

5. MIS Vs. DSS.

No.	Management Information System	Decision Support System
1.	Reports summaries of basic transactions and exceptions from plan	Provides data and models for decision making
2.	Uses simple analytical tools	Uses sophisticated analysis and modeling tools
3.	Solves structured, repetitive problems	Solves Unstructured & semi-structured problems
4.	Produces routine reports	Provides interactive answers to non-routine questions
5.	The Output formats are pre-defined or fixed	The Output formats are Flexible and Adaptable
6.	Serves to mid-level management	Serves to Top/upper level managers

6. TPS Vs. MIS.

No.	Transaction Processing System	Management Information System
1.	IS that manages data created in everyday operations. This includes storing, formatting, processing, retrieving, and creating some new aggregate data.	IS that generates reports on transpired business operations for mid-level management.
2.	Records daily, routine activities.	Uses outputs from TPS. Reports are scheduled (routine) or exception reports.
3.	Serves supervisory / low level of management.	Serves mid-level management level.
4.	It is also known as transaction processing or real-time processing.	It is also called administrative system (used for —administration‖) or reporting system.

THE END

5. BUSINESS PROCESS AUTOMATION THROUGH APPLICATION SOFTWARE

PART A- FAST TRACK NOTES

What are Business Applications and its types?

1. Business is defined as a person"s <u>regular occupation</u> or <u>commercial activity</u>, a person"s concern.

2. <u>Application</u> is defined as a <u>computer program</u> to fulfill a <u>particular purpose</u>.

3. Business Application is a <u>programs</u> used to fulfill a person"s need for regular work or commercial activity.

4. Business applications are <u>software or set of software</u> used by <u>business people</u>.

5. **Types of Business Applications:** <u>Classification</u> is an attempt to categorize various types of <u>business applications</u> on a <u>logical basis.</u>

Classification of Business Applications

Types	Nature of Processing	Source of Application	Nature of Business	Functions Covered
Type I	Batch Processing	In-house Developed	Small business	Accounting Application
Type II	Online Processing	Purchased Application	Medium Business	Cash Management
Type III	Real-time Processing	Leased	Large business	Manufacturing Applications
More types	No	Yes	No	Yes

a) **Nature of processing:** This is the way <u>an application</u> updates data, say in <u>batch processing</u>, there is a <u>time delay</u> in <u>occurrence and recording</u> of transaction. On the other hand in online processing, the transactions are recorded at the moment they occur. An application that allows query handling/ responses to updates in system is classified as real time processing system.

b) **Source of application:** It is defined as the <u>source</u> from where <u>application</u> has been bought. <u>TALLY</u>, is a <u>purchased application</u>. An entity may get an application developed for itself, this is in-house developed application. A new method for getting applications is being used today, i.e. leased applications, where user pays fixed rent for using the application for agreed terms. Many specialized vendors provide users with option to get their job done by paying monthly rent, this is referred to as outsourcing.

c) **Nature of business:** This classification is based on the <u>users</u> for whom the application has been <u>developed</u>. Here, the <u>emphasis</u> is on size and complexity of <u>business process</u>.

d) **Functions covered:** A <u>business application</u> may be classified based on <u>business function</u> it covers. For example, accounting applications, Office Management software, Compliance application, Customer relationship management, Decision making software, ERP software, Product lifecycle management, etc.

Explain the Business applications based on nature of application?

Business applications based on nature of applications are:

a) **Accounting Applications:** These are used by business entities for the purpose of day-to-day transactions of accounting and generating financial information such as balance sheet, profit and loss account and cash flow statements. Examples are TALLY, wings, SAP and Oracle Financials.

b) **Office Management Software:** These applications help entities to manage their office requirements like word processors (MS Word), electronic spreadsheets (MS Excel), presentation software (PowerPoint), file sharing systems, etc.

c) **Compliance Applications:** Enterprises need to obey with applicable laws and regulations. India has taken a long stride in adopting e-compliance for its citizens with government promoting e-filing of documents, e-payments taxes, e-storage of data, etc.

d) **Customer Relationship Management Software:** These are specialized applications catering to the need of organizations largely in FMCG (Fast-Moving Consumer Goods) categories. These entities need to interact with their customers and respond to them. The response may be in the form of service support or may lead to product innovation.

e) **Management Support Software:** These are applications catering to decision-making needs of the management. They may be further classified based on the level of management using them. For example, Management Information System is generally used by middle level managers for their decision making needs.

f) **ERP Software:** These applications are used by entities to manage resources optimally and to maximize the three Es i.e. Economy, Efficiency and Effectiveness of business operations.

g) **Product Lifecycle Management Software:** These business applications are used by enterprises that launch new products and are involved in development of new products.

h) **Logistics Management Software:** For large logistics managing companies, these are key business applications. These companies need to keep track of products and people across the globe to check whether there are any discrepancies that need action.

i) **Legal Management Software:** In India, a lot of effort is being put to digitize the legal system. Government of India is keen to reduce the pendency in courts. As this process goes on legal profession in India shall need such systems.

j) **Industry Specific Applications:** These are industry specific applications focused on a specific industry sector. For example, software designed especially for banking applications, Insurance applications, Automobile dealer system, billing systems for malls, Cinema ticketing software, Travel industry related software, etc.

What is Business Process Automation (BPA)? Explain the success factors while implementing BPA in an organization?

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a) A business process is a set of activities that are designed to accomplish specific organizational goals.

b) BPA is a strategy to automate business processes so as to bring benefit to enterprise in terms of cost, time and effort.

c) The core objective is achieved through integrating various business processes.

d) The primary reasons for automation by enterprises are: Cost Saving: To remain competitive & fast service to customers.

The success of any business process automation shall only be achieved when BPA ensures:

a) **Confidentiality:** To ensure that data is only <u>available</u> to persons who have <u>right</u> to see the same;

b) **Integrity:** To ensure that <u>no un-authorized</u> amendments can be made in the data.

c) **Availability:** To ensure that <u>data is available</u> when asked for.

d) **Timeliness:** To ensure that <u>data</u> is made available in at the <u>right time</u>.

Explain How to go about BPA?

The steps to go about implementing <u>business process automation:</u>

a) **Step 1: Define why we plan to implement a BPA -** The <u>primary purpose</u> for which enterprise implements <u>automation</u> may vary from enterprise to enterprise.

b) **Step 2: Understand the rules / regulation under which enterprise needs to comply with -** One of the most important steps in automating any business process is to understand the <u>rules of engagement</u>, which include the rules, adhering to regulations and document retention requirements.

c) **Step 3: Document the process, we wish to automate -** At this step, all the documents that are <u>currently being used</u> need to be <u>documented</u>.

d) **Step 4: Define the objectives/goals to be achieved by implementing BPA -** Once the above steps have been completed, entity needs to determine the key <u>objectives</u> of the process <u>improvement activities</u>.

e) **Step 5: Engage the business process consultant -** To achieve BPA, decide which company/ consultant to partner with, depends upon <u>Objectivity of consultant</u> in understanding/evaluating <u>entity situation</u>.

f) **Step 6: Calculate the ROI for project -** The right stakeholders need to be <u>engaged and involved</u> to ensure that the benefits of BPA are clearly <u>communicated and implementation</u> becomes successful.

g) **Step 7: Developing the BPA -** Once the requirements have been document, ROI has been <u>computed and top management approval</u> to go ahead has been received, the consultant develops the <u>requisite</u> BPA.

h) **Step 8: Testing the BPA -** Once developed, it is important to test the <u>new process</u> to determine how well it works and the process of testing is an <u>iterative process</u>, the objective being to remove all problems during this phase.

What are the Applications that help entity to achieve BPA?

1. <u>Many applications</u> are available today that help enterprise to achieve business process automation.

2. Few applications may be <u>simpler</u>; others may be <u>more complex</u> based on nature of process being considered.

3. Some of them are:

   a) TALLY:
   » It is an accounting application that helps entity to <u>automate processes</u> relating to accounting of transactions.
   » It also helps to achieve automation of few processes in <u>inventory management</u>.

» The latest version has been upgraded to help user achieve TAX compliances also.

» It has features such as Remote Access Capabilities, Tax Audit and Statutory Compliance, Payroll, Excise for Manufacturers, Multilingual Support, VAT Composition Returns, TDS, VAT (Value Added Tax) etc.

b) SAP R/3:

» It is ERP software, which allows an entity to integrate its business processes.

» ERP aims at better utilization of the resources and helps entity achieve better business performance.

» It has the features such as time management, reporting and analytics, budget monitoring, workflow approval, sales management, team management, leave management, travel management, recruitment management and demand planning.

c) MS Office Applications: These are various office automation systems made available by Microsoft Corporation which include MS Word, MS Excel, MS PowerPoint, MS Access, etc.

d) Attendance Systems:

» The application helps entity to automate the process of attendance tracking and report generation.

» It has features such as supervisor login access, holiday pay settings, labour distribution, employee scheduling and rounding, employee view time card, overtime settings, etc.

e) Vehicle Tracking System:
» Applications allowing owner of goods to check the temperature of cold stored goods while in transit.
» It has features such as GPS based location, GPRS connection based real-time online data-logging and reporting, route accuracy on the fly while device is moving, real-time vehicle tracking, SMS & e-mail notifications etc.

f) Travel Management Systems: Many business processes specific to this industry have been automated, including ticket booking for air, bus, train, hotel, etc.

g) Educational Institute Management Systems:

» India probably produces maximum number of engineers, doctors, MBAs and CAs across the world. A lot of automation has been achieved, including student tracking and record keeping.

» ICAI, itself is a good example of this automation.

» A student based on his registration number can file many documents online including exam forms.

h) Automated Toll Collection Systems: Many toll booths allow users to buy pre-paid cards, where user need not stop in lane to pay toll charges, but just swipe / wave the card in front of a scanner.

i) Department Stores Systems: There has been huge development in the retail sector in India, which includes the billing processes and inventory management.

j) File Management System:

» With increasing inventory of office files and records, many office automation systems have been developed.

» These allow office records to be kept in soft copy and easy tracking of the same.

» It has features such as web access, search, Microsoft office integration, records management software, electronic forms (e-forms), calendar, etc.

What are the major Control Objectives in Business Process Automation (BPA)?

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1. <u>Control</u> is defined as <u>policies, procedures, practices</u> and <u>organization structure</u> that are designed to <u>provide reasonable assurance</u> that business objectives are achieved and undesired events are <u>prevented or detected and corrected</u>.

2. <u>Major control objectives</u> are given as follows:

   a) **<u>Authorization:</u>** Ensures that all transactions are approved by <u>responsible personnel</u> in accordance with their <u>specific or general</u> authority before the transaction is <u>recorded.</u>

   b) **<u>Completeness:</u>** Ensures that <u>no valid transactions</u> have been <u>omitted</u> from the accounting records.

   c) **<u>Accuracy:</u>** Ensures that all <u>valid transactions</u> are <u>accurate</u>, <u>consistent</u> with the <u>originating</u> transaction data, and information is recorded in a <u>timely manner</u>.

   d) **<u>Validity:</u>** Ensures that all recorded transactions fairly represent the <u>economic events</u> that actually occurred, are <u>lawful in nature</u>, and have been executed in accordance with management's <u>general authorization</u>.

   e) **<u>Physical Safeguards and Security:</u>** Ensures that access to physical assets and information systems are controlled and properly restricted to <u>authorized personnel.</u>

   f) **<u>Error Handling:</u>** Ensures that <u>errors detected</u> at any stage of processing receive prompts corrective action and are reported to the <u>appropriate level of management.</u>

   g) **<u>Segregation of Duties:</u>** Ensures that <u>duties are assigned</u> to individuals in a manner that ensures that no <u>one individual can control</u> both the recording function and the procedures relative to processing a <u>transaction</u>.

Explain different Types of Controls?

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1. Control is defined as <u>policies, procedures, practices and organization</u> structure that are designed to <u>provide</u> reasonable assurance that <u>business objectives</u> are <u>achieved</u> and <u>undesired events</u> are <u>prevented or</u> <u>detected and corrected</u>.

2. Controls may either be **Application Controls** or **Internal Controls**.

   a) **<u>Application controls:</u>**

      » Application controls are the controls on the sequence of processing events.

      » These controls cover all phases of data right from data origination to its final disposal.

      » <u>Application controls</u> cover transactions as they <u>recorded in each stage</u> of processing into master, parameter and transaction files and include controls relating to <u>transmission and distribution of output</u> through display, electronic media or <u>printed reports</u>.

      » Application controls ensure that all transactions are authorized, complete and accurate.

   b) **<u>Internal controls:</u>** SA-315 defines the system of <u>internal control</u> as the plan of enterprise and all the <u>methods and procedures</u> adopted by the <u>management</u> of an entity to assist in achieving management‟s <u>objective</u> of ensuring, as far as <u>practicable</u>, the orderly and efficient conduct of its business, including adherence to management policies, the <u>safeguarding of assets</u>, <u>prevention and detection</u> of <u>fraud and error</u>, the <u>accuracy and completeness</u> of the accounting records, and the <u>timely preparation of reliable</u> financial information.

What are various Application Controls?

a) These are the controls on the <u>sequence of processing events</u>.

b) These can be <u>classified </u>into the following types:

- » Boundary controls
- » Input controls
- » Process controls
- » Output control
- » Database controls

Discuss Boundary controls in detail?

1. The major controls of the boundary system are the <u>access control mechanisms</u>.

2. Access controls are implemented with an access control mechanism and links the <u>authentic users</u> to the <u>authorized resources </u>they are <u>permitted to access</u>.

3. The <u>access control mechanism </u>has <u>three steps</u>:

- » Identification
- » Authentication
- » Authorization

4. <u>**Boundary control techniques:**</u>

- **a) Cryptography:** There are programs that transform data into codes that appear <u>meaningless </u>to anyone who does not <u>have authentication </u>to access the respective system <u>resource or file</u>.

- **b) Passwords:** User identification by an <u>authentication </u>mechanism with <u>personal characteristics</u> like name, birth date, employee code, function, designation, etc.

- **c) Personal Identification Numbers (PIN):** it is similar to a <u>password </u>assigned to a user by an institution based on the user characteristics and <u>encrypted </u>using a <u>cryptographic algorithm</u>.

- **d) Identification Cards:**
  - » Identification cards <u>store information </u>required in an <u>authentication process</u>. „
  - » These cards are used to <u>identify a user</u>.

Discuss Input Controls in detail?

- These are responsible for <u>ensuring the accuracy and completeness </u>of data and instruction <u>input into an application system</u>.

- These are important since substantial time is spent on inputting data which involves <u>human intervention </u>and are therefore prone to <u>errors and fraud</u>.

- Input control techniques are:

  - **a) <u>Source Document Control:</u>**
    - » In systems that use <u>physical source documents </u>to <u>initiate transactions</u>, careful control must be exercised over these <u>instruments</u>.
    - » <u>Source document </u>fraud can be used to <u>remove assets </u>from the <u>enterprise</u>.

  - **b) <u>Data Coding Controls:</u>** These controls are put in place to <u>reduce </u>user error during <u>data feeding</u>.

Few types of Errors with respect to input controls:

» **Addition:** Addition of an extra character in a code. e.g. 12345 coded as 712345;

» **Truncation:** Omission of characters in the code. e.g. 12345 coded as 2345;

» **Transcription:** Recording wrong characters. 12345 coded as 82345;

» **Transposition:** Reversing adjacent characters. 12345 coded as 21345; and

» **Double transposition:** Reversing characters separated by one or more characters i.e., 12345 is entered as 23145.

Discuss Output Controls in detail?

1. These ensure that the data delivered to users will be presented, formatted and delivered in a consistent and secured manner.

2. Output can be in any form, it can either be a printed data report or a database file in a removable media such as a flash drive or CD-ROM or it can be a Word document on the computer"s hard disk.

3. Whatever the type of output, it should be ensured that the confidentiality and integrity of the output is maintained and that the output is consistent.

4. **Storage and Logging of Sensitive and Critical Forms:** Pre-printed stationery should be stored securely to prevent unauthorized destruction or removal and usage.

5. **Logging of Output Program Executions:** When programs, used for output of data, are executed, they should be logged and monitored.

6. **Controls over Printing:** It should be ensured that unauthorized disclosure of information printed is prevented.

7. **Report Distribution and Collection Controls:**

   a) Distribution of reports should be made in a secure way to avoid unauthorized disclosure of data.

   b) A log should be maintained as to what reports were generated and to whom it was distributed.

   c) The user should be responsible for timely collection of the report especially if it is printed in a public area. Uncollected reports should be stored securely.

8. **Retention Controls:** Retention controls consider the duration for which outputs should be retained before being destroyed.

9. **Existence/Recovery Controls:** These controls are needed to recover output in the event that it is lost or destroyed.

What do you understand by Database Controls? Discuss in brief?

Protecting the integrity of a database when application software acts as an interface to interact between the user and the database are called the update controls.

a) **Sequence Check Transaction and Master Files:** Synchronization and the correct sequence of processing between the master file and transaction file is critical to maintain the integrity of updation, insertion or deletion of records in the master file with respect to the transaction records.

b) **Ensure all records on files are processed:** While processing the transaction file records mapped to the respective master file the end-of-file of the transaction file with respect to the end-of-file of the master file is to be ensured.

c) __Process multiple transactions for a single record in the correct order:__ Multiple transactions can occur based on a __single master record__. For example, dispatch of a product to different distribution centers. The order in which transactions are processed against the product __master record __ must be done based on a __sorted transaction codes__.

What are Process Controls? How process controls are used to have consistency in the control process?

__Process Controls:__

» Data processing controls perform __validation checks __ to identify errors during __processing of data__.

» They are required to ensure both the __completeness __ and the __accuracy __ of data being __processed__.

» Processing controls are imposed through __database management system __ that __stores __ the data.

Some of the update controls are:

a) __Run-to-run Totals:__ These help in __verifying data __ that is subject to process through __different stages__.

b) __Reasonableness Verification:__ Two or more fields can be __compared __ and cross __verified __ to ensure their __correctness__.

c) __Edit Checks:__ Edit checks similar to the __data validation __ controls can also be used at the __processing stage __ to verify __accuracy and completeness __ of data

d) __Field Initialization:__ __Data overflow __ can occur, if records are constantly added to a __table __ or if fields are added to a __record __ without __initializing __ it, i.e., __setting all values __ __to zero __ before inserting the __field or record__.

e) __Exception Reports:__ Exception reports are generated to __identify errors __ in data processed. Such exception reports give the __transaction code __ and why the particular transaction was __not processed __ and what __error __ in processing the __transaction.__

f) __Existence/Recovery Controls:__ The check-point/restart logs, facility is __a short-term backup __ and recovery control that enables a system to be __recovered __ if failure is __temporary __ and __localized.__

Writer about Validation Controls?

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1. These controls validate the __accuracy/correctness __ of input data.

2. Input Validation Controls are intended to detect errors in transaction data before the data are __processed__.

3. Validation procedures are most __effective __ when they are performed as close to the __source of the transactions __ as possible.

4. There are following levels of __input validation controls__, which are:

a) __Level 1: Field Interrogation:__

» **Limit Check:** It may be applied to both the __input data and the output data__. The field is checked by the program to ensure that its __value lies __ within __certain predefined limits.__

» **Picture Checks:** Picture check against __incorrect input format__. For example, all rooms are numbered by numeric. An incorrect room number 9X5 would be filtered.

» **Valid Code Checks:** These checks are made against __predetermined transactions __ codes, tables or order data to ensure that __input data are valid__.

» **Check Digits:** A customers" account number or any other numeric digits are checked for __transcription __ and __transposition errors__.

» **Arithmetic Check:** Arithmetic check is performed in different ways to <u>validate the results </u>of <u>other computations </u>of the values of selected data fields.

» **Cross Checks:** These may be employed to <u>verify fields appearing </u>in different files to see that the <u>results tally</u>.

b) <u>**Level 2: Record Interrogation:**</u>

» **Sequence Checks:** These are exercised to <u>detect any missing transactions</u>, off serially numbered vouchers or <u>erroneous sorting</u>.

» **Format Completeness Checks:** These are used to check the presence and position of all the fields in a transaction. This check is particularly useful for variable data field records.

» **Redundant Data Checks:** These are used to check for <u>fields </u>that are <u>repeated </u>in <u>two of more records</u>.

» **Password:** These are used to <u>authorize users </u>to access, read and write information.

What do you means by the term Network Virtualization? Explain Major application of Virtualization?

- Virtualization is the process of <u>creating logical computing resources </u>from available <u>physical resources</u>.

- This is accomplished using <u>virtualization software </u>to create a layer of <u>abstractio</u>n between <u>workloads </u>and the underlying <u>physical hardware</u>.

- Network Virtualization allows a <u>large physical network </u>to be provisioned into multiple smaller logical networks.

- This behavior allows <u>administrator</u>s to improve network <u>traffic control</u>, <u>enterprise and security</u>.
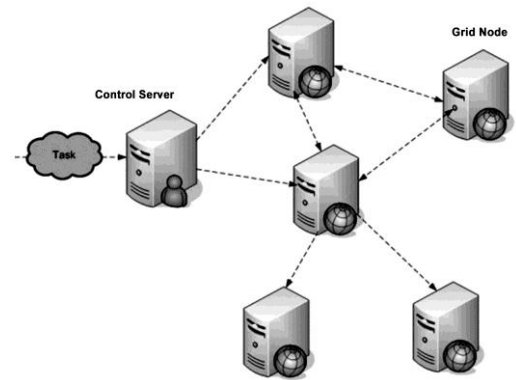
<u>**Major applications:**</u>

a) **Server Consolidation:** <u>Virtual machines </u>are used to <u>consolidate </u>many physical servers into fewer servers, which in turn host virtual machines. This is also known as "<u>Physical-to-Virtual</u>" or 'P2V' transformation.

b) **Disaster Recovery:** Virtual machines can be used as "<u>hot standby</u>" environments for physical production servers. This changes the classical "backup-and-restore" philosophy, by <u>providing backup images </u>that can "boot" into <u>live virtual machines</u>, capable of taking over workload for a production server <u>experiencing an outage</u>.

c) **Testing and Training:** Hardware virtualization can give <u>root </u>access to a <u>virtual machine</u>. This can be very useful such as in <u>kernel development </u>and <u>operating system </u>courses.

d) **Portable Applications:** Portable applications are needed when <u>running an application </u>from a <u>removable drive, </u>without installing it on the system's main disk drive.

e) **Portable Workspaces:** Recent technologies have used virtualization to <u>create portable</u> workspaces on devices like iPods and USB memory sticks.

What is Grid Computing? Why we need Grid Computing?

<u>**Grid Computing:**</u>

a) This is a <u>computer network </u>in which each computer's resources are <u>shared </u>with <u>every other computer </u>in the system.

b) Processing power, memory and data storage are <u>all community</u> resources that <u>authorized users</u> can tap into and leverage for <u>specific tasks</u>.

c) This system can be as <u>simple</u> as a collection of similar computers running on the <u>same operating system</u> or as <u>complex</u> as <u>inter-networked</u> systems comprised of every <u>computer platform</u>.

d) Grid computing is a form of <u>distributed computing</u> where a virtual computing system is compiled by using many loosely connected computing devices to perform a large <u>computing task</u>.

e) In distributed computing, <u>different computers</u> within the same <u>network share</u> one or more <u>resources</u>.

Need of Grid Computing:

a) <u>Civil engineers</u> work together to design, execute, & analyze shake table experiments

b) An <u>insurance company</u> mines data from partner hospitals for fraud detection.

c) An <u>application service provider</u> offloads excess load to a compute cycle provider.

d) An enterprise configures <u>internal & external resources</u> to support e-Business.

e) <u>Large-scale science and engineering</u> are done through the interaction of people, heterogeneous computing resources, information systems and instruments, all of which are geographically and organizationally dispersed.

What is meant by Cloud Computing?

a) A <u>cloud</u> is a <u>collection</u> of servers, applications, databases, documents, agreements, spread sheets, storage capacity etc which allows organizations to share these resources from <u>anywhere</u>.

b) <u>Cloud Computing</u> is the <u>use of various services</u>, such as software development platforms, servers, storage, and software, over the <u>Internet</u>, often referred to as the "cloud."

c) The best example of cloud computing is <u>Google Apps</u> where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet.

d) The <u>common cloud computing service models</u> are software as a Service (<u>SaaS</u>), Platform as a Service (<u>PaaS</u>) and Infrastructure as a service (<u>IaaS</u>).
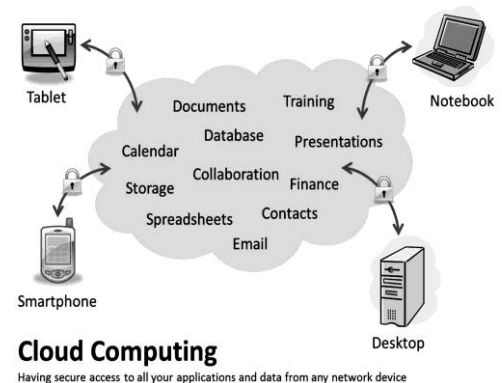
What are the Characteristics of Cloud Computing?

a) **Elasticity and Scalability: G**ives us the <u>ability to expand</u> and <u>reduce</u> resources according to the <u>specific service requirement</u>.

b) **Pay-per-Use:** We pay for <u>cloud services</u> only when we use them, either for the <u>short term</u> or for a longer duration.

c) **On-demand:** Because we invoke <u>cloud services</u> only when we need them, they are not permanent parts of the IT infrastructure, this is a <u>significant advantage</u> for <u>cloud use</u>.

d) Resiliency: The resiliency of a cloud service offering can completely isolate the failure of server and storage resources from cloud users. Work is migrated to a different physical resource in the cloud with or without user awareness and intervention.

e) Multi Tenancy: Public cloud service providers often can host the cloud services for multiple users within the same infrastructure. Server and storage isolation may be physical or virtual depending upon the specific user requirements.

f) Workload Movement: This characteristic is related to resiliency and cost considerations.

Discuss the Advantages and Disadvantages of Cloud Computing?

Advantages:

a) Cost Efficient: It is a cost efficient method to use, maintain and upgrade.

b) Easy Access to Information: It provides easy to access information from anywhere through an Internet connection.

c) Almost Unlimited Storage: Storing information is almost unlimited.

d) Backup and Recovery: Since all the data is stored in the cloud, backing up and restoring is relatively much easier.

e) Automatic Software Integration: In the cloud, software integration is usually something that occurs automatically.

f) Quick Deployment: The entire system can be fully functional in a matter of a few minutes.

Disadvantages:

a) Technical Issues: This technology is always prone to outages and other technical issues.

b) Security in the Cloud: Surrendering all the company"s sensitive information to a third-party cloud service provider could potentially put the company to great risk.

c) Prone to Attack: Storing information in the cloud could make the company vulnerable to external hack attacks and threats.

What are the significant differences between Cloud Computing and Grid Computing.

Cloud Computing:

» Suited for any size of data storage

» Suited for both standard or day to day and computational intensive tasks.

» Very high uptime availability

» Provide sharing of infrastructure and thus help to reduce cost.

Grid Computing:

» Suited for big size of data storage

» Suited for computational intensive tasks only.

» True for grid computing services as well.

» Provides sharing of infrastructure and also help to reduce costs.

Write about Client Server model.

a) Client/Server (C/S) refers to a computing technology in which the hardware and the software components (i.e., clients and servers) are distributed across a network.

b) It is an advancement of the traditional computing models.

c) It is a technology in which the server software accepts requests for data from client software and returns the results to the client. The client processes the data and presents the results to the user.

d) This technology intelligently divides the processing work between the server and the workstation.

e) The server handles all the global tasks while the workstation handles all the local tasks.

f) The server only sends those records to the workstation that are needed to satisfy the information request. As a result network traffic is significantly reduced.

g) This is a versatile, message based and modular infrastructure.

h) It improves usability, flexibility, interoperability and scalability when compared to centralised, mainframe, time sharing computing.

i) This is very fast, secure, reliable, efficient, inexpensive and easy to use.

## How can Client computers be classified?

Client: A single-user workstation that provides a presentation services and the appropriate computing, connectivity and the database services relevant the business need.

These can be classified as Fat Client, Thin Client or Hybrid Client.

a) **Fat / Thick Client:** It is a client that performs the bulk of any data processing operations itself, and does not necessarily rely on the server. For example – Personal Computer.

b) **Thin Client:** Thin clients use the resources of the host computer. It generally presents processed data provided by an application server. A device using web application is a thin client.

c) **Hybrid Client:** It is a mixture of the thick and thin client models. Similar to a fat client, it processes locally, but relies on the server for storing persistent data. Hybrid clients are well suited for video gaming.

Discuss the Working of Client/Server architecture.

a) Servers are typically powerful computers running advanced network operating systems. Servers can host e-mail; store common data files and serve powerful network applications, validates login to the network and can deny access to both networking resources as well as client software.

b) End user Personal Computer or Network Computer workstations are the Clients.

c) Clients are interconnected by local area networks and share application processing with network servers, which also manage the networks. Client and Server can operate on separate computer platforms.
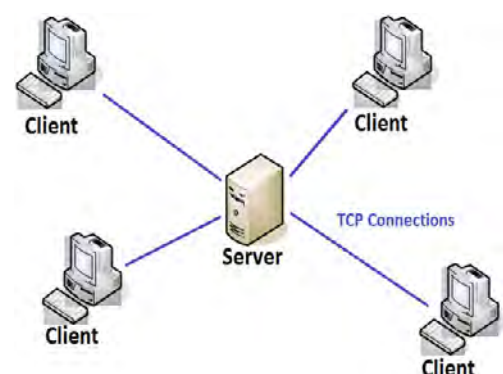
d) Either the client platform or the server platform can be <u>upgraded</u> without having to upgrade the other <u>platform</u>.

e) The server is able to service <u>multiple clients concurrently</u>; in some client/server systems, clients can access multiple servers.

f) <u>Action</u> is usually initiated at the client end, not the server end.

g) The network system implemented within the client/server technology is a <u>Middleware</u>.

h) Middleware allows for <u>communication</u>, <u>directory services</u>, <u>queuing</u>, <u>distributed file sharing</u>, and <u>printing.</u>

Discuss some of the characteristics and issues of Client/Server (C/S) architecture?

a) <u>Service:</u> C/S provides as clean separation of function based on the <u>idea of service</u>. The <u>server process</u> is a <u>provider of services</u> and the <u>client</u> is a <u>consumer</u> of services.

b) <u>Shared Resources:</u> A server can service many clients at the same <u>time and regulate</u> their access to the shared resources.

c) <u>Transparency of Location:</u> C/S software usually masks the location of the server from the clients by the <u>redirecting the service</u> calls when needed

d) <u>Mix-and-Match:</u> The ideal C/S software us <u>independent of hardware</u> or Operating System software platforms.

e) <u>Scalability:</u> In a C/S environment, client work stations can either be <u>added or removed</u> and also the server load can be distributed across multiple servers.

f) <u>Integrity:</u> The server code and server data is <u>centrally managed</u>, which results in cheaper maintenance and the guarding of <u>shared data integrity.</u>

### Write about Peer – to – peer network?

a) <u>It is a network</u> with <u>two or more PCs</u> connected together and share resources without going through a <u>separate server computer</u>.

b) It can be an <u>adhoc connection</u> – a couple of computer connected via a universal serial bus to transfer files.

c) It can be used to link half dozen computers in a small <u>office over copper wires</u>.

d) The prime goal is that many computers come together and pool their resources to form a content <u>distribution system</u>.

e) <u>Advantages:</u>

» <u>Easy and simple to set up</u>.

» Very <u>simple</u> and <u>cost effective</u>.

» If one <u>computer fails</u> to work, all other computers connected to it <u>continue</u> to work

f) <u>Disadvantages:</u>

» There can be problem in <u>accessing files</u> if computers are not connected properly.

» It does <u>not support</u> connections with too many computers.

» The <u>data security</u> is very poor in this architecture.
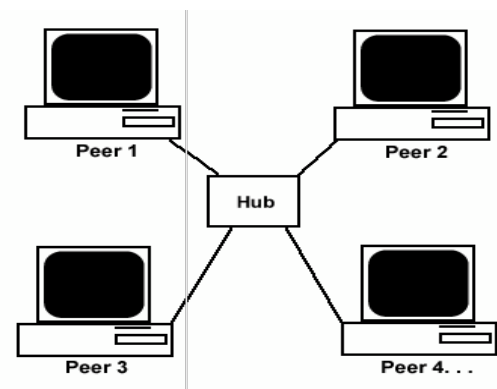
Discuss Multi-Tier Architecture?

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1. **Single Tier Systems/ One-Tier architecture:**

   » A single computer that contains a <u>database and a front-end</u> (GUI) to access the database is known as Single Tier System.

   » Generally, this type of system is used in <u>small businesses</u>.

   » One-tier architecture involves putting all of the required components for a software application or technology on a <u>single server or platform</u>.
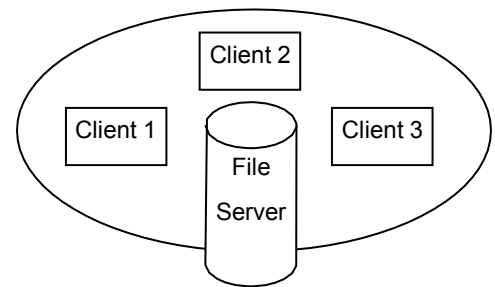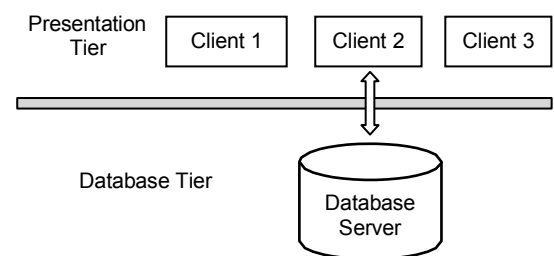
   Advantages:

   » It requires only one <u>stand-alone computer</u>.

   » It also requires only one installation of <u>proprietary software</u> which makes it the most <u>cost- effective</u> system available.

   Disadvantages:

   » It can be used by only <u>one user at a time</u>.

   » It is impractical for an organization which requires two or more users to interact with the <u>organizational data stores</u> at the <u>same time</u>.

   Single Tier Architecture

2. **Two Tier Systems:**

   » A two-tier system consists of a <u>client and a server.</u>

   » It is software architecture in which a <u>presentation layer</u> runs on a client, and a data layer gets <u>stored</u> on a server.

   » In other words, the database is <u>stored on the server</u>, and the <u>interface</u> used to access the <u>database</u> is installed on the client.

   2-Tier Architecture

   Advantages:
   » The system <u>performance</u> is higher because <u>business logic</u> and <u>database</u> are physically close.
   » Since processing is shared between the <u>client and server</u>, more users could interact with system.
   » It is easy to <u>setup and maintain</u> entire system smoothly.
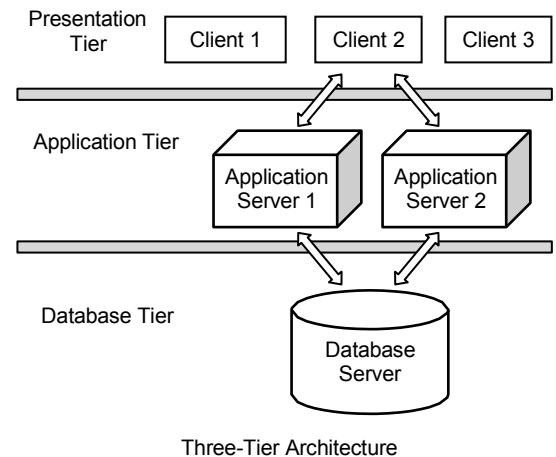
   Disadvantages:
   » <u>Performance</u> deteriorates if number of users is greater than 100.
   » Restricted <u>flexibility</u>.

3. **Three-tier architecture:**

   » It is a <u>client-server architecture</u> in which the functional process logic, data access, computer data storage and user interface are developed and maintained as <u>independent modules</u> on <u>separate platforms</u>.

   » This is a <u>software design pattern</u> and well-established software architecture.

   » It is <u>used</u> when an effective distributed client/server design is needed that provide increased <u>performance, flexibility, maintainability, reusability and scalability.</u>

The three tiers in three-tier architecture are:

» **Presentation Tier:** Occupies the top level and displays information related to services available on a website. This tier communicates with other tiers by sending results to the browser and other tiers in the network.

» **Application Tier:** Also called the middle tier, logic tier, business logic or logic tier, this tier is pulled from the presentation tier. It controls application functionality by performing detailed processing.

» **Data Tier:** Houses database servers where information is stored and retrieved. Data in this tier is kept independent of application servers or business logic.

Three-Tier Architecture

Advantages:

a) **Clear separation of user-interface-control and data presentation from application-logic:** With this separation more clients are able to have access to a wide variety of server applications. The two main advantages for client-application are:

  » Quicker development.

  » Shorter test phase.

b) **Dynamic load balancing:**

  » If bottlenecks in terms of performance occur, the server process can be moved to other servers at runtime.

c) **Change management:** It is easy and faster to exchange a component on the server than to furnish numerous PCs with new program versions.

Disadvantages:

» It creates an increased need for network traffic management, server load balancing, and fault tolerance.

» Current tools are relatively immature and are more complex.

» Maintenance tools are currently inadequate for maintaining server libraries.

4. **n-tier Architecture:**

  » The client program has only UI code.

  » The UI code talks to the "middle tier" on which the business and database logic sits. In turn the middle tier talks to the database.

  » If necessary the middle tier can be placed on the same machine as the database.

  » In either case the data "traffic" is highest between database logic and database.

Advantages of Multi-tier architecture:

» Forced separation of UI and business logic.

» Low bandwidth network.

» Business logic sits on a small number of centralised machines.

PART B- 1 MARK QUESTIONS DEFINITIONS

1. **Business Process Automation:**

   - It is a strategy to automate business processes so as to bring <u>benefit</u> to enterprise in terms of <u>cost, time and effort</u>.

   - The <u>core objective</u> of BPA is achieved through <u>integrating</u> various business processes.

   - The <u>primary reasons</u> for automation by enterprises are: Cost Saving, remain competitive, fast service to customers:

2. **TALLY:**

   - It is an accounting application that helps entity to <u>automate processes</u> relating to accounting of transactions.

   - It also helps to achieve automation of few processes in <u>inventory management.</u>

   - It has features such as <u>Remote Access Capabilities</u>, Tax Audit and Statutory Compliance, Payroll, Excise for Manufacturers, Multilingual Support, VAT Composition Returns, TDS, VAT (Value Added Tax) etc.

3. **SAP R/3:**

   - It is ERP <u>software</u>, which allows an entity to <u>integrate</u> its business processes.

   - It has the features such as <u>time management</u>, reporting and analytics, budget monitoring, workflow approval, sales management, team management, leave management, travel management, recruitment management and demand planning.

4. **Vehicle Tracking System:**

   - Applications <u>allowing owner</u> of goods to check the temperature of cold stored goods while in <u>transit.</u>

   - It has features such as <u>GPS based location</u>, GPRS connection based real-time online data-logging and reporting, route accuracy on the fly while device is moving, real-time vehicle tracking, <u>SMS & e-mail notifications</u> etc.

5. **File Management System:**

   - These allow office records to be kept in <u>soft copy</u> and easy tracking of the same.

   - It has features such as web access, search, Microsoft office integration, records management software, electronic forms (e-forms), calendar, etc.

6. **Customer Relationship Management Software:**

   - These are specialized applications catering to the need of organizations largely in **FMCG** (Fast-Moving Consumer Goods) categories.

   - These entities need to interact with their customers and respond to them. The response may be in the form of service support or may lead to product innovation.

7. **Educational Institute Management Systems:**

   - <u>ICAI,</u> itself is a good example of Educational Institute Management Systems.

   - A student based on his/her <u>registration number</u> can file many documents <u>online</u> including exam forms.

   - It has features such as student‟s registration, student‟s admission, fee collection, student‟s attendance, result management and result analysis.

8. **Input Controls:**

    - These are responsible for <u>ensuring the accuracy and completeness</u> of data and instruction <u>input into an application system</u>.

    - These are important since substantial time is spent on inputting data which involves <u>human intervention</u> and are therefore prone to <u>errors and fraud</u>.

    - **Input control techniques are:** Source Document Control & Data Coding Controls.

9. **Output Controls:**

    - These ensure that the data delivered to users will be presented, formatted and delivered in a consistent and secured manner.

    - Whatever the type of output, it should be ensured that the <u>confidentiality</u> and <u>integrity</u> of the output is maintained and that the output is <u>consistent</u>.

10. **Database Controls**: Protecting the <u>integrity of a database</u> when application software acts as an interface to interact between <u>the user</u> and the <u>database</u> are called the <u>update controls</u>.

11. **Network Virtualization:**

    - In computing, network virtualization is the process of combining hardware and software network resources and network functionality into a single, software-based administrative entity, a virtual network.

    - Allows a <u>large physical network</u> to be provisioned into multiple smaller logical networks.

    - This behavior allows <u>administrator</u>s to improve network <u>traffic control</u>, <u>enterprise and security</u>.

12. **Virtualization**

    - It is the process of creating logical computing resources from available physical resources.

    - This is accomplished using <u>virtualization software</u> to create a layer of <u>abstractio</u>n between <u>workloads</u> and the underlying <u>physical hardware.</u>

13. **Grid Computing:**

    - It is a <u>computer network</u> in which each computer's resources are <u>shared</u> with <u>every other computer</u> in the system. It is a special kind of <u>distributed computing</u>.

    - Processing power, memory and data storage are <u>all community</u> resources that <u>authorized users</u> can tap into and leverage for <u>specific tasks</u>.

    - This system can be as <u>simple</u> as a collection of similar computers running on the <u>same operating system</u> or as <u>complex</u> as <u>inter-networked</u> systems comprised of every <u>computer platform</u>.

14. **Cloud Computing:**

    - Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility over a network (typically the Internet).

    - Clouds can be classified as public, private or hybrid

    - The <u>common cloud computing service models</u> are software as a Service (<u>SaaS</u>), Platform as a Service (<u>PaaS</u>) and Infrastructure as a service (<u>IaaS</u>).

15. **Client Server model:**

    - It is a technology in which the server software accepts requests for data from client software and returns the results to the client. The <u>client processes</u> the data and presents the results to the user.

- Client server technology <u>intelligently divides</u> the processing work between the server and the workstation.

- The server handles all the <u>global tasks</u> while the workstation handles all the <u>local tasks</u>.

16. Client:

- Client is a single-user <u>workstation</u> that provides a presentation services and the appropriate computing, connectivity and the database services relevant the business need.

- Client computers can be classified as Fat Client, Thin Client or Hybrid Client.

17. Peer – to – peer network:

- It is a distributed application architecture that partitions tasks or workloads between peers. Peers are equally privileged, equipotent participants in the application.

- Peers make a portion of their resources, such as processing power, disk storage or network bandwidth, directly available to other network participants, without the need for central coordination by servers

18. Centralized systems:

- It is computing technology done at a <u>central location</u>, using terminals that are <u>attached to a central computer</u>.

- The computer itself may <u>control</u> all the peripherals directly or they may be attached via a <u>terminal server</u>.

19. Decentralized systems:

- It is the <u>collection of resources</u>, both hardware and software, to each individual workstation, or office location which are capable of running <u>independently</u> of each other.

- These systems enable file sharing and all computers can share peripherals such as printers and scanners as modems, allowing all the computers in the network to <u>connect to the internet</u>.

20. Cryptography:

- It is the practice and study of techniques for secure communication in the presence of third parties (called Adversaries).

- More generally, it is about constructing and analyzing protocols that overcome the influence of adversaries and which are related to various aspects in information security such as data confidentiality, integrity, authentication, and non-repudiation.

21. Encryption

- In cryptography, encryption is the process of encoding messages or information in such a way that only authorized parties can read it.

- Encryption does not of itself prevent interception, but denies the message content to the interceptor.

- In other words, Encryption is a process of converting a Plain text into a cipher text.
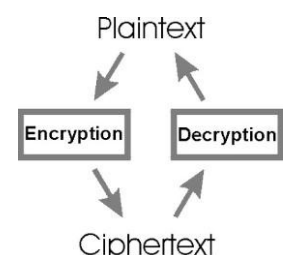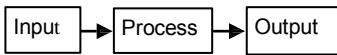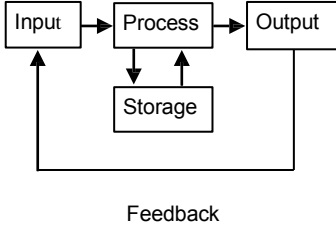
22. Decryption

- Decryption is generally the reverse process of encryption.

- It is the process of decoding the data which has been encrypted into a secret format. An authorized user can only decrypt data because decryption requires a secret key or password

- In other words, Decryption is a process of Converting a cipher text into a Plain text.

PART C – DIFFERENCES

1. **Manual Information Processing Cycle Vs. Computerized Information Processing Cycle.**

No.	Manual Information Processing Cycle	Computerized Information Processing Cycle
1.	Systems where the level of manual intervention is very high. For example- Evaluation of exam papers, teaching and operations in operation theatres.	Systems where computers are used at every stage of transaction processing and human intervention is minimal.
2.	Include following components: • **Input:** Put details in register. • **Process:** Summarize the information; and • **Output:** Present information to management in the form reports.	Include following components: • **Input:** Entering data into the computer; • **Process:** Performing operations on the data; • **Storage:** Saving data, programs, or output for future use; and • **Output:** Presenting the results.
3.	Input → Process → Output	Input → Process → Output, Process → Storage, Feedback

THE END