END TERM EXAMINATION (MODEL PAPER-1)

EIGHTH SEMESTER [B.TECH]

Paper Code: ETIT 410 Subject: E-Commerce & ERP

Time: 3 Hours Maximum Marks: 75

Note: Question 1 is compulsory. Attempt 1 Question from each unit.

Q.1 (a) What is E-commerce? Explain the unique features of E-commerce. (5)

(b)Differentiate between e-commerce and e-business (5)

(c) What is MRP? List various banefits and drawbacks. (5)

(d) What is Domain Name System ? (5)

(e) Define Online Shopping? List various Online Shopping techniques . (5)

UNIT -1

Q.2 (a) What is Firewall ? (5)

(b) Explain the key security threats in e-commerce environment ? (7.5)

Q3. . Explain digital payment system with example. (12.5)

UNIT II

Q4 a) What do you understand by the term EDI? Explain the layered architecture of EDI. (6.5 marks)

b) What are smart cards? Explain the different types of smart cards. (6 marks)

UNIT III

Q5 What is ERP? How can ERP improve a company's business performance? (12.5 marks)
Q6 - Describe the various modules of ERP. (12.5 marks)

UNIT IV

Q.7 Describe OLAP and the various ways it is implemented? (12.5)

Q.8 What is MIS? How is it used in ERP and business application? (12.5)

ANSWERS

ANS 1.(A) Electronic commerce, commonly known as **E-commerce** or **eCommerce**, is trading in products or services conducted via computer networks such as the Internet. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange(EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices, social media, and telephones as well.

Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions. This is an effective and efficient way of communicating within an organization and one of the most effective and useful ways of conducting business. It is a Market entry strategy where the company may or may not have a physical presence.

ANS. 1(B)

E-commerce covers outward-facing processes that touch customers, suppliers and external partners, including sales, marketing, order taking, delivery, customer service, purchasing of raw materials and supplies for production and procurement of indirect operating-expense items, such as office supplies. It involves new business models and the potential to gain new revenue or lose some existing revenue to new competitors.
It's ambitious but relatively easy to implement because it involves only three types of integration: vertical integration of front-end Web site applications to existing transaction systems; cross-business integration of a company with Web sites of customers, suppliers or intermediaries such as Web-based marketplaces; and integration of technology with modestly redesigned processes for order handling, purchasing or customer service.

E-business includes e-commerce but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources. E-business strategy is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency, productivity and cost savings.
An e-business strategy is also more difficult to execute, with four directions of integration: vertically, between Web front- and back-end systems; laterally, between

a company and its customers, business partners, suppliers or intermediaries; horizontally, among e-commerce, enterprise resource planning (ERP), customer relationship management (CRM), knowledge management and supply-chain management systems; and downward through the enterprise, for integration of new technologies with radically redesigned business processes. But e-business has a higher payoff in the form of more efficient processes, lower costs and potentially greater profits.

Ans.1(c)

Manufacturing resource planning (MRP II) is an integrated method of operational and financial planning for manufacturing companies. MRP II serves as an extension of MRP(closed loop manufacturing resource planning, also abbreviated as CLMRP).

The typical MRP II system employs a modular organizational structure. Modules keep track of, and regulate, specific characteristics and functions of the entire organization. Examples include, but are not limited to, the following:

- Product design
- Product specifications
- QC (quality control)
- QA (quality assurance)
- Shop floor control
- Order management
- Purchasing
- Inventory
- Cost calculation
- Cost reporting
- General accounting
- Cash flow
- Tax calculation
- Tax payments

MRP is used to derive the master schedule from the forecast, the sales order or both. The master schedule is the foundation of all the operations, with MRP handling all the ordering and scheduling of the inventory (raw materials, components, etc).

One big advantage of MRP is that it analyses and plans your future needs for all dependant demand items. If an item is not needed, you don't plan for it any more.

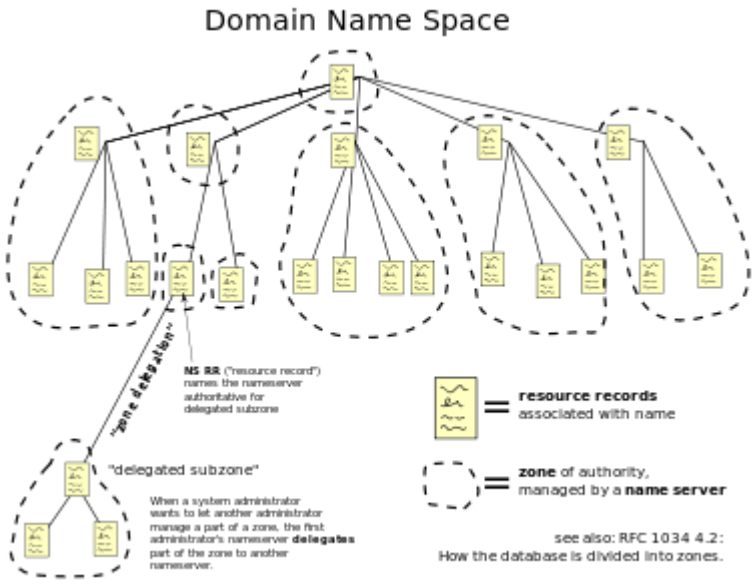
ANS 1(D)

The **Domain Name System** (**DNS**) is a hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participating entities. Most prominently, it translates easily memorized domain names to the numerical IP addresses needed for the purpose of locating computer services and devices worldwide. The Domain Name System is an essential component of the functionality of the Internet.

The Domain Name System distributes the responsibility of assigning domain names and mapping those names to IP addresses by designating authoritative name servers for each domain. Authoritative name servers are assigned to be responsible for their supported domains, and may delegate authority over subdomains to other name servers. This mechanism provides distributed and fault tolerant service and was designed to avoid the need for a single central database.

The Domain Name System also specifies the technical functionality of this database service. It defines the DNS protocol, a detailed specification of the data structures and data communication exchanges used in DNS, as part of the Internet Protocol Suite.

The Internet maintains two principal namespaces, the domain name hierarchy and the Internet Protocol (IP) address spaces .The Domain Name System maintains the domain name hierarchy and provides translation services between it and the address spaces. Internet name servers and a communication protocol implement the Domain Name System.A DNS name server is a server that stores the DNS records for a domain name, such as address (A or AAAA) records, name server (NS) records, and mail exchanger (MX) records (see also list of DNS record types); a DNS name server responds with answers to queries against its database.



ANS 1(E)

Online shopping or **e-shopping** is a form of electronic commerce which allows consumers to directly buy goods or services from a seller over the Internet using a web browser. Alternative names are: e-web-store, e-shop, e-store, Internet shop, web-shop, web-store, online store, online storefront and virtual store. Mobile commerce (or m-commerce) describes purchasing from an online retailer's mobile optimized online site or app.

An online shop evokes the physical analogy of buying products or services at a bricks-and-mortar retailer or shopping center; the process is called business-to-consumer (B2C) online shopping. In the case where a business buys from another business, the process is called business-to-business (B2B) online shopping. The largest of these online retailing corporations are Alibaba,Amazon.com,and eBay .Retail success is no longer all about physical stores. This is evident because of the increase in retailers now offering online store interfaces for consumers. With the growth of online shopping, comes a wealth of new market footprint coverage opportunities for stores that can appropriately cater to offshore market demands and service requirements.

Techniques :

- Look around for coupon codes before making online purchases. Online stores love providing discounts, and a simple search can help you find them. Just type “promo code” along with the retailer’s name, and see what pops up. This is one way you can save when shopping online.

- Don’t risk your information and finances on a site that is unfamiliar or shady. Check to be sure that security signs such as Cybertrust and Verisign are in place.
- Check out the address bar of your browser before you enter your credit card number into a Web form. If the URL begins with “https” rather than “http”, then you know that the website is secure. Otherwise, the website is not properly secured; therefore, you could be exposed to potential fraud due to the fact that your personal information.

Unit -1

Ans 2 (a) :

In computing, a **firewall** is a software or hardware-based network security system that controls the incoming and outgoing network traffic based on applied rule set. A firewall establishes a barrier between a trusted, secure internal network and another network (e.g., the Internet) that is not assumed to be secure and trusted.

Many personal computer operating systems include software-based firewalls to protect against threats from the public Internet. Many routers that pass data between networks contain firewall components and, conversely, many firewalls can perform basic routing functions. The term *firewall* originally referred to a wall intended to confine a fire or potential fire within a building. Later uses refer to similar structures, such as the metal sheet separating the engine compartment of a vehicle or aircraft from the passenger compartment.

Firewall technology emerged in the late 1980s when the Internet was a fairly new technology in terms of its global use and connectivity.

Ans 2(b)

Attackers and the Motives of Attacks

 Attack Trends Highlight

 Relevance to e-Commerce

Attacks and Counter-attack Strategies

E-commerce security is the protection of e-commerce assets from unauthorized access, use, alteration, or destruction. While security features do not guarantee a secure system, they are necessary to build a secure system.

Security features have four categories:

- Authentication: Verifies who you say you are. It enforces that you are the only one allowed to logon to your Internet banking account.
- Authorization: Allows only you to manipulate your resources in specific ways. This prevents you from increasing the balance of your account or deleting a bill.
- Encryption: Deals with information hiding. It ensures you cannot spy on others during Internet banking transactions.
- Auditing: Keeps a record of operations. Merchants use auditing to prove that you bought a specific merchandise.
- Integrity: prevention against unauthorized data modification
- Nonrepudiation: prevention against any one party from reneging on an agreement after the fact
- Availability: prevention against data delays or removal.

Ans 3 :

An **e-commerce payment system** facilitates the acceptance of electronic payment for online transactions. Also known as a sample of Electronic Data Interchange (EDI), e-commerce payment systems have become increasingly popular due to the widespread use of the internet-based shopping and banking.

Over the years, credit cards have become one of the most common forms of payment for e-commerce transactions. In North America almost 90% of online B2C transactions were made with this payment type Tu\rban et al. goes on to explain that it would be difficult for an online retailer to operate without supporting credit and debit cards due to their widespread use. Increased security measures include use of the card verification number (CVN) which detects fraud by comparing the verification number printed on the signature strip on the back of the card with the information on file with the cardholder's issuing bank.Also online merchants have to comply with stringent rules stipulated by the credit and debit card issuers (Visa and MasterCard this means that merchants must have security protocol and procedures in place to ensure transactions are more secure. This can also include having a certificate from an authorized certification authority (CA) who provides PKI(Public-Key infrastructure) for securing credit and debit card transactions.

Despite widespread use in North America, there are still a large number of countries such as China, India and Pakistan that have some problems to overcome in regard to credit card security. In the meantime, the use of smartcards has become

extremely popular. A Smartcard is similar to a credit card; however it contains an embedded 8-bit microprocessor and uses electronic cash which transfers from the consumers' card to the sellers' device. A popular smartcard initiative is the VISA Smartcard. Using the VISA Smartcard you can transfer electronic cash to your card from your bank account, and you can then use your card at various retailers and on the internet.

There are companies that enable financial transactions to transpire over the internet, such as PayPal. Many of the mediaries permit consumers to establish an account quickly, and to transfer funds into their on-line accounts from a traditional bank account (typically via ACH transactions), and *vice versa*, after verification of the consumer's identity and authority to access such bank accounts. Also, the larger mediaries further allow transactions to and from credit card accounts, although such credit card transactions are usually assessed a fee (either to the recipient or the sender) to recoup the transaction fees charged to the mediary.

The speed and simplicity with which cyber-mediary accounts can be established and used have contributed to their widespread use, although the risk of abuse, theft and other problems—with disgruntled users frequently accusing the mediaries themselves of wrongful behavior—is associated with them.

Methods :

- **Net Banking**

This is a system, well known in India that does not involve any sort of physical card. It is used by customers who have accounts enabled with Internet Banking. Instead of entering card details on the purchaser's site, in this system the payment gateway allows one to specify which bank they wish to pay from. Then the user is redirected to the bank's website, where one can authenticate oneself and then approve the payment

- **Paypal**

PayPal is a global e-commerce business allowing payments and money transfers to be made through the Internet. Online money transfers serve as electronic alternatives to paying with traditional paper methods, such as checks and money orders. It is subject to the US economic sanction list, and subject to other rules and interventions required by US laws or government.

- **Google Wallet**

Google Wallet was launched in 2011, serving a similar function as PayPal to facilitate payments and transfer money online. It also features highly robust security and additional features, such as the ability to send payments as attachments via email

Ans 4 (A) - EDI (Electronic Data Interchange) is a standard format for exchanging business data. The standard is ANSI X12 and it was developed by the Data Interchange Standards Association. ANSI X12 is either closely coordinated with or is being merged with an international standard, EDIFACT.

An EDI message contains a string of *data elements*, each of which represents a singular fact, such as a price, product model number, and so forth, separated by delimiter. The entire string is called a *data segment*. One or more data segments framed by a header and trailer form a *transaction set*, which is the EDI unit of transmission (equivalent to a *message*). A transaction set often consists of what would usually be contained in a typical business document or form. The parties who exchange EDI transmissions are referred to as *trading partners*.

EDI messages can be encrypted.

EDI architechture specifies 4 layers:-

1)Semantic (application layer)

2)Standard transaction layer

3)Packing (transport) layer

4)Physical n/w infrastructure layer.

1)Semantic layer:- It describes the business application that is driving EDI.

For a procurement application, this translates into requests for quotes, price quotes, purchase orders, acknoledgements & involves.

The information seen at this layer must be translated from a company specific from to a more generic form so that it can be send to various trading partners, who could be using a varity of software applications at this end.

When a trading partner sends a document, the EDI translation software converts the proprietary format into a standard mutually agreed on by the processing system. When a company receivers the document, their EDI translation software automatically changes the standard format into proprietary format of their document processing software so that company can manipulate the information in whatever way it chooses to.

2. EDI standards:- It specify business form structure and it also influence the content at application layer.

3. The most two important standards are:-

- EDIPACT

- ANSI X12

3.EDI transport layer:- it corresponds closely with the non-electronic activity of sending a business form from one company A to company B.

The business form could be sent via regular postal service, registered mail, certified mail or private carrier such as united pariel service (UPS) or simply faxed between the companies.

EDI semantic layer application level services

EDI standard layer EDIFACT

ANSI X12

EDI transport layer e- mail X 435

Point2point FTP

www HTTP

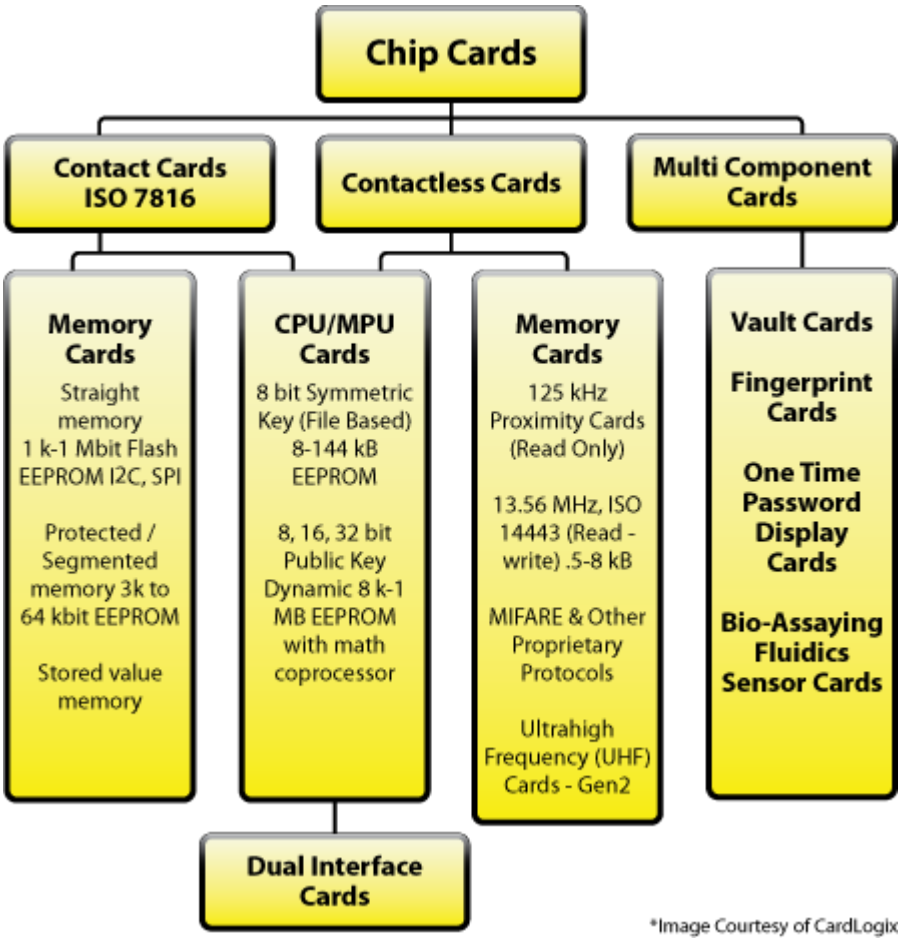
4.Physical layer :- Dial up lines

Ans 4 (B) - A **smart card**, **chip card**, or **integrated circuit card** (**ICC**) is any pocket-sized card with embedded integrated circuits. Smart cards are made of plastic, generally polyvinyl chloride, but sometimes polyethylene terephthalate based polyesters, acrylonitrile butadiene styrene or polycarbonate. Since April 2009, a Japanese company has manufactured reusable financial smart cards made from paper.

Smart cards can provide identification, authentication, data storage and application processing. Smart cards may provide strong security authentication for single sign-on (SSO) within large organizations.

Types of smart cards:T

Smart cards are defined according to 1). How the card data is read and written 2). The type of chip implanted within the card and its capabilities. There is a wide range of options to choose from when designing your system.



Card Construction

Mostly all chip cards are built from layers of differing materials, or substrates, that when brought together properly gives the card a specific life and functionality. The typical card today is made from PVC, Polyester or Polycarbonate. The card layers are printed first and then laminated in a large press. The next step in construction is the blanking or die cutting. This is followed by embedding a chip and then adding data to the card. In all, there may be up to 30 steps in constructing a card. The total components, including software and plastics, may be as many as 12 separate items; all this in a unified package that appears to the user as a simple device.

Contact Cards

These are the most common type of smart card. Electrical contacts located on the outside of the card connect to a card reader when the card is inserted. This connector is bonded to the encapsulated chip in the card.

Increased levels of processing power, flexibility and memory will add cost. Single function cards are usually the most cost-effective solution. Choose the right type of smart card for your application by determining your required level of security and evaluating cost versus functionality in relation to the cost of the other hardware elements found in a typical workflow. All of these variables should be weighted against the expected lifecycle of the card. On average the cards typically comprise only 10 to 15 percent of the total system cost with the infrastructure, issuance, software, readers, training and advertising making up the other 85 percent. The following chart demonstrates some general rules of thumb:

Memory Cards

Memory cards cannot manage files and have no processing power for data management. All memory cards communicate to readers through synchronous protocols. In all memory cards you read and write to a fixed address on the card. There are three primary types of memory cards: *Straight*, *Protected*, and *Stored Value*. Before designing in these cards into a proposed system the issuer should check to see if the readers and/or terminals support the communication protocols of the chip. Most contactless cards are variants on the protected memory/segmented memory card idiom.

Straight Memory Cards

These cards just store data and have no data processing capabilities. Often made with I2C or serial flash semiconductors, these cards were traditionally the lowest cost per bit for user memory. This has now changed with the larger quantities of processors being built for the GSM market. This has dramatically cut into the advantage of these types of devices. They should be regarded as floppy disks of varying sizes without the lock mechanism. These cards cannot identify themselves to the reader, so your host system has to know what type of card is being inserted into a reader. These cards are easily duplicated and cannot be tracked by on-card identifiers.

Protected / Segmented Memory Cards

These cards have built-in logic to control the access to the memory of the card. Sometimes referred to as Intelligent Memory cards, these devices can be set to write- protect some or the entire memory array. Some of these cards can be configured to restrict access to both reading and writing. This is usually done through a password or system key. Segmented memory cards can be divided into logical sections for planned multi-functionality. These cards are not easily duplicated but can possibly be impersonated by hackers. They typically can be tracked by an on-card identifier.

Stored Value Memory Cards

These cards are designed for the specific purpose of storing value or tokens. The cards are either disposable or rechargeable. Most cards of this type incorporate permanent security measures at the point of manufacture. These measures can include password keys and logic that are hard-coded into the chip by the manufacturer. The memory arrays on these devices are set-up as decrements or counters. There is little or no memory left for any other function. For simple applications such as a telephone card, the chip has 60 or 12 memory cells, one for each telephone unit. A memory cell is cleared each time a telephone unit is used. Once all the memory units are used, the card becomes useless and is thrown away. This process can be reversed in the case of rechargeable cards.

Contactless Cards

These are smart cards that employ a radio frequency (RFID) between card and reader without physical insertion of the card. Instead, the card is passed along the exterior of the reader and read. Types include proximity cards which are implemented as a read-only technology for building access. These cards function with a very limited memory and communicate at 125 MHz. Another type of limited card is the Gen 2 UHF Card that operates at 860 MHz to 960 MHz.

True read and write contactless cards were first used in transportation applications for quick decrementing and reloading of fare values where their lower security was not an issue. They communicate at 13.56 MHz and conform to the ISO 14443 standard. These cards are often protected memory types. They are also gaining popularity in retail stored value since they can speed up transactions without lowering transaction processing revenues (i.e. Visa and MasterCard), unlike traditional smart cards.

Variations of the ISO14443 specification include A, B, and C, which specify chips from either specific or various manufacturers. A=NXP-(Philips) B=Everybody else and C=Sony only chips. Contactless card drawbacks include the limits of cryptographic functions and user memory, versus microprocessor cards and the limited distance between card and reader required for operation.

UNIT III

Ans 5 - Enterprise resource planning software, or ERP, doesn't live up to its acronym. Forget about planning—it doesn't do much of that—and forget about resource, a throwaway term. But remember the enterprise part. This is ERP's true ambition. It attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments' particular needs.

That is a tall order, building a single software program that serves the needs of people in finance as well as it does the people in human resources and in the warehouse. Each of those departments typically has its own computer system optimized for the particular ways that the department does its work. But ERP combines them all together into a single, integrated software program that runs off a single database so that the various departments can more easily share information and communicate with each other.

That integrated approach can have a tremendous payback if companies install the software correctly.

Take a customer order, for example. Typically, when a customer places an order, that order begins a mostly paper-based journey from in-basket to in-basket around the company, often being keyed and rekeyed into different departments' computer systems along the way. All that lounging around in in-baskets causes delays and lost orders, and all the keying into different computer systems invites errors. Meanwhile, no one in the company truly knows what the status of the order is at any given point because there is no way for the finance department, for example, to get into the warehouse's computer system to see whether the item has been shipped. "You'll have to call the warehouse" is the familiar refrain heard by frustrated customers.

ERP vanquishes the old standalone computer systems in finance, HR, manufacturing and the warehouse, and replaces them with a single unified software program divided into software modules that roughly approximate the old standalone systems. Finance, manufacturing and the warehouse all still get their own software, except now the software is linked together so that someone in finance can look into the warehouse software to see if an order has been shipped. Most vendors' ERP software is flexible enough that you can install some modules without buying the whole package. Many companies, for example, will just install an ERP finance or HR module and leave the rest of the functions for another day.

How can ERP improve a company's business performance?

ERP's best hope for demonstrating value is as a sort of battering ram for improving the way your company takes a customer order and processes it into an invoice and revenue—otherwise known as the order fulfillment process. That is why ERP is often referred to as back-office software. It doesn't handle the up-front selling process (although most ERP vendors have developed CRM software or acquired pure-play CRM providers that can do this); rather, ERP takes a customer order and provides a software road map for automating the different steps along the path to fulfilling it. When a customer service representative enters a customer order into an ERP system, he has all the information necessary to complete the order (the customer's credit rating and order history from the finance module, the company's inventory levels from the warehouse module and the shipping dock's trucking schedule from the logistics module, for example).

People in these different departments all see the same information and can update it. When one department finishes with the order it is automatically routed via the ERP system to the next department. To find out where the order is at any point, you need only log in to the ERP system and track it down. With luck, the order process moves like a bolt of lightning through the organization, and customers get their orders faster and with fewer errors than before. ERP can apply that same magic to the other major business processes, such as employee benefits or financial reporting.

That, at least, is the dream of ERP. The reality is much harsher.

Let's go back to those inboxes for a minute. That process may not have been efficient, but it was simple. Finance did its job, the warehouse did its job, and if anything went wrong outside of the department's walls, it was somebody else's problem. Not anymore. With ERP,

the customer service representatives are no longer just typists entering someone's name into a computer and hitting the return key. The ERP screen makes them businesspeople. It flickers with the customer's credit rating from the finance department and the product inventory levels from the warehouse. Will the customer pay on time? Will we be able to ship the order on time? These are decisions that customer service representatives have never had to make before, and the answers affect the customer and every other department in the company. But it's not just the customer service representatives who have to wake up. People in the warehouse who used to keep inventory in their heads or on scraps of paper now need to put that information online. If they don't, customer service reps will see low inventory levels on their screens and tell customers that their requested item is not in stock. Accountability, responsibility and communication have never been tested like this before.

People don't like to change, and ERP asks them to change how they do their jobs. That is why the value of ERP is so hard to pin down. The software is less important than the changes companies make in the ways they do business. If you use ERP to improve the ways your people take orders, manufacture goods, ship them and bill for them, you will see value from the software. If you simply install the software without changing the ways people do their jobs, you may not see any value at all—indeed, the new software could slow you down by simply replacing the old software that everyone knew with new software that no one does.

Ans 6 - A "module" is a group of related programs performing a major function within an ERP. Since there is no particular order that makes sense, we have chosen to list the modules in alphabetical order. Some of the decisions about what constitutes a module are arbitrary. Since an ERP is designed to accommodate a variety of industries, not every enterprise would use every module.

Module Documentation Layout describes how the information about each module is organized.

An ERP package is composed of the following modules:

Finance and Performance Management

- Accounts Payable and Receivable - ERP system offer a financial overviews of global business partner relationships in the Accounts, Receivable and Payable functions .these sub-ledgers are integrated ,both with the general ledger with the areas in sales and distribution and Materials Management, where financial data originates. Accounts Receivable and payable transactions are performed automatically when related processes take place in other modules.
- Bank Reconciliation
- Cash Management
- Currency

- Fixed Assets - Accounts Receivable and payable transactions are performed automatically when related processes take place in other modules.
- General Ledger - The General ledger (GL) is essential both to the financial accounting system and to strategic decision-making . Through active integration with business processes in logistics and in the accounting sub-ledgers , the GL serves as a central pool of financial data for financial reporting as well as for other accounting areas. The general ledger supports all the function needed in a financial accounting system.
- Bond Manager
- Job Costing
- Time Billing
- Investment Manager
- Share Manager

Customer Relationship Management

- Customer Relationship Management (CRM)
- Help Desk
- Call Center
- Contacts
- Sales Analysis
- Sales Compensation

Human Resource Management

- Employee Scheduling
- Human Resources
- Payroll

Supply-Chain Management

- Inventory - Inventory Management system allows you to manage your stocks on a quantity and value basis, plan, enter and check any goods movements and carry out physical inventory.
- Manufacturing
- Order Entry/Invoicing
- Preventative Maintenance
- Pricing
- Purchasing - Purchasing is a very important component of the Material Management module. The Material Management module is fully integrated with other modules in the system.

- Quotation/Estimation
- Receiving
- Shipping
- Service Management

Technical Architecture

- Systems Administration
- Business Intelligence (BI)
- Workflow

ANS 7 : **online analytical processing**, or **OLAP** is an approach to answering multi-dimensional analytical queries swiftly. OLAP is part of the broader category of business intelligence, which also encompasses relational database, report writing and data mining. Typical applications of OLAP include business reporting for sales,marketing, management reporting, business process management(BPM),[1] budgeting and forecasting, financial reporting and similar areas, with new applications coming up, such as agriculture. The term *OLAP* was created as a slight modification of the traditional database term OLTP (Online Transaction Processing).

OLAP tools enable users to analyze multidimensional data interactively from multiple perspectives. OLAP consists of three basic analytical operations: consolidation (roll-up), drill-down, and slicing and dicing.Consolidation involves the aggregation of data that can be accumulated and computed in one or more dimensions. For example, all sales offices are rolled up to the sales department or sales division to anticipate sales trends. By contrast, the drill-down is a technique that allows users to navigate through the details. For instance, users can view the sales by individual products that make up a region's sales. Slicing and dicing is a feature whereby users can take out (slicing) a specific set of data of the OLAP cube and view (dicing) the slices from different viewpoints.

Databases configured for OLAP use a multidimensional data model, allowing for complex analytical and ad hoc queries with a rapid execution time.[7] They borrow aspects ofnavigational databases, hierarchical databases and relational databases.

Overview of OLAP systems

The core of any OLAP system is an OLAP cube (also called a 'multidimensional cube' or a hypercube). It consists of numeric facts called *measures* which are categorized by*dimensions*. The measures are placed at the intersections of the hypercube, which is spanned by the dimensions as a Vector space. The usual interface to manipulate an OLAP cube is a matrix interface like Pivot tables in a spreadsheet program, which performs projection operations along the dimensions, such as aggregation or averaging.

The cube metadata is typically created from a star schema or snowflake schema or fact constellation of tables in a relational database. Measures are derived from the records in the fact table and dimensions are derived from the dimension tables.

Each *measure* can be thought of as having a set of *labels*, or meta-data associated with it. A *dimension* is what describes these *labels*; it provides information about the *measure*.

A simple example would be a cube that contains a store's sales as a *measure*, and Date/Time as a *dimension*. Each Sale has a Date/Time *label* that describes more about that sale.

Any number of *dimensions* can be added to the structure such as Store, Cashier, or Customer by adding a foreign key column to the fact table. This allows an analyst to view the *measures* along any combination of the *dimensions*.

For example:

Multidimensional databases

Multidimensional structure is defined as “a variation of the relational model that uses multidimensional structures to organize data and express the relationships between data”.The structure is broken into cubes and the cubes are able to store and access data within the confines of each cube. “Each cell within a multidimensional structure contains aggregated data related to elements along each of its dimensions”.Even when data is manipulated it remains easy to access and continues to constitute a compact database format. The data still remains interrelated. Multidimensional structure is quite popular for analytical databases that use online analytical processing (OLAP) applications.Analytical databases use these databases because of their ability to deliver answers to complex business queries swiftly. Data can be viewed from different angles, which gives a broader perspective of a problem unlike other models.

Aggregations

It has been claimed that for complex queries OLAP cubes can produce an answer in around 0.1% of the time required for the same query on OLTP relational data. The most important mechanism in OLAP which allows it to achieve such performance is the use of *aggregations*. Aggregations are built from the fact table by changing the granularity on specific dimensions and aggregating up data along these dimensions. The number of possible aggregations is determined by every possible combination of dimension granularities.

The combination of all possible aggregations and the base data contains the answers to every query which can be answered from the data.

Because usually there are many aggregations that can be calculated, often only a predetermined number are fully calculated; the remainder are solved on demand. The

problem of deciding which aggregations (views) to calculate is known as the view selection problem. View selection can be constrained by the total size of the selected set of aggregations, the time to update them from changes in the base data, or both. The objective of view selection is typically to minimize the average time to answer OLAP queries, although some studies also minimize the update time. View selection is NP-Complete. Many approaches to the problem have been explored, including greedy algorithms randomized search,genetic algorithms and A* search algorithm.

Types

OLAP systems have been traditionally categorized using the following taxonomy.

Multidimensional

Main article: MOLAP

MOLAP is a "multi-dimensional online analytical processing". 'MOLAP' is the 'classic' form of OLAP and is sometimes referred to as just OLAP. MOLAP stores this data in an optimized multi-dimensional array storage, rather than in a relational database. Therefore it requires the pre-computation and storage of information in the cube - the operation known as processing. MOLAP tools generally utilize a pre-calculated data set referred to as a data cube. The data cube contains all the possible answers to a given range of questions. MOLAP tools have a very fast response time and the ability to quickly write back data into the data set.

Advantages of MOLAP

- Fast query performance due to optimized storage, multidimensional indexing and caching.
- Smaller on-disk size of data compared to data stored in relational database due to compression techniques.
- Automated computation of higher level aggregates of the data.
- It is very compact for low dimension data sets.
- Array models provide natural indexing.
- Effective data extraction achieved through the pre-structuring of aggregated data.

Disadvantages of MOLAP

- Within some MOLAP Solutions the processing step (data load) can be quite lengthy, especially on large data volumes. This is usually remedied by doing only incremental processing, i.e., processing only the data which have changed (usually new data) instead of reprocessing the entire data set.

- MOLAP tools traditionally have difficulty querying models with dimensions with very high cardinality (i.e., millions of members).
- Some MOLAP products have difficulty updating and querying models with more than ten dimensions. This limit differs depending on the complexity and cardinality of the dimensions in question. It also depends on the number of facts or measures stored. Other MOLAP products can handle hundreds of dimensions.
- Some MOLAP methodologies introduce data redundancy.

Relational

Main article: ROLAP

ROLAP works directly with relational databases. The base data and the dimension tables are stored as relational tables and new tables are created to hold the aggregated information. It depends on a specialized schema design. This methodology relies on manipulating the data stored in the relational database to give the appearance of traditional OLAP's slicing and dicing functionality. In essence, each action of slicing and dicing is equivalent to adding a "WHERE" clause in the SQL statement. ROLAP tools do not use pre-calculated data cubes but instead pose the query to the standard relational database and its tables in order to bring back the data required to answer the question. ROLAP tools feature the ability to ask any question because the methodology does not limit to the contents of a cube. ROLAP also has the ability to drill down to the lowest level of detail in the database.

ANS 8 :

A **management information system** (**MIS**) provides information that organizations require to manage themselves efficiently and effectively. Management information systems are typically computer systems used for managing. The five primary components:
1.) *Hardware,* 2.) *Software,* 3.) *Data (information for decision making),* 4.) Procedures (design,development and documentation), and 5.) People (individuals, groups, or organizations). Management information systems are distinct from other information systems because they are used to analyze and facilitate strategic and operational activities.

Academically, the term is commonly used to refer to the study of how individuals, groups, and organizations evaluate, design, implement, manage, and utilize systems to generate information to improve efficiency and effectiveness of decision making, including systems termed decision support systems, expert systems, and executive information systems.[1] Most business schools (or colleges of business administration within universities) have an MIS department, alongside departments of accounting, finance, management, marketing, and sometimes others, and grant degrees (at undergrad, masters, and PhD levels) in MIS.

Content

A MIS gives business managers the information they need to make decisions and solve problems, while facilitating data from different aspects of a project.Early business computers were used for simple operations such as tracking inventory, billing, sales, or payroll data, with little detail or structure. Over time, these computer applications became more complex and previously isolated applications, such as card systems and magnetic storage, became connected in the 1980s and allowed a way to network the information together. With greater computing capability and the networks to link the necessary information, MIS became a standard among many companies.

Originally, MIS described applications providing managers with information about sales, inventories, and other data that would help in managing the enterprise. Over time, the term broadened to include: decision support systems, resource management and human resource management, enterprise resource planning, enterprise performance management,supply chain management, customer relationship management, project management and database retrieval applications.

An MIS provides three types of information to managers:

- Detailed, which confirms activities
- Summary, which puts information in an easy-to-read form
- Exception, which deals with all information outside the normal scope of activities

History

Kenneth C. Laudon and Jane Laudon identify five *eras* of MIS evolution corresponding to the five phases in the development of computing technology: 1) mainframe and minicomputer computing, 2) personal computers, 3) client/server networks, 4) enterprise computing, and 5) cloud computing.

The *first era* (mainframe and minicomputer) was ruled by IBM and their mainframe computers; these computers would often take up whole rooms and require teams to run them - IBM supplied the hardware and the software. As technology advanced, these computers were able to handle greater capacities and therefore reduce their cost. Smaller, more affordable minicomputers allowed larger businesses to run their own computing centers in-house.

The *second era* (personal computer) began in 1965 as microprocessors started to compete with mainframes and minicomputers and accelerated the process of decentralizing computing power from large data centers to smaller offices. In the late 1970s minicomputer technology gave way to personal computers and relatively low cost computers were becoming mass market commodities, allowing businesses to provide their employees access to computing power that ten years before would have cost tens of thousands of dollars. This

proliferation of computers created a ready market for interconnecting networks and the popularization of the Internet.

As technological complexity increased and costs decreased, the need to share information within an enterprise also grew—giving rise to the *third era* (client/server), in which computers on a common network access shared information on a server. This lets thousands and even millions of people access data simultaneously. The *fourth era* (enterprise) enabled by high speed networks, tied all aspects of the business enterprise together offering rich information access encompassing the complete management structure.Every computer is utilized.

The *fifth era* (cloud computing) is the latest and employs networking technology to deliver applications as well as data storage independent of the configuration, location or nature of the hardware. This, along with high speed cellphone and wifi networks, led to new levels of mobility in which managers access the MIS remotely with laptop and tablet computers, plus smartphones.

Types and Terminology

The terms *Management Information System* (MIS), *information system*, *Enterprise Resource Planning* (ERP), and *information technology management* are often confused. Information systems and MIS are broader categories that include ERP. Information technology management concerns the operation and organization of information technology resources independent of their purpose.

Most management information systems specialize in particular commercial and industrial sectors, aspects of the enterprise, or management substructure.

- *Management information systems*, produce fixed, regularly scheduled reports based on data extracted and summarized from the firm's underlying to middle and operational level managers to identify and inform structured and semi-structured decision problems.
- *Decision Support Systems (DSS)* are computer program applications used by middle and higher management to compile information from a wide range of sources to support problem solving and decision making.DSS is majorly used for semi-structured and unstructured decision problems.
- *Executive Information Systems (EIS)* is a reporting tool that provides quick access to summarized reports coming from all company levels and departments such as accounting, human resources and operations.
- *Marketing Information Systems* are Management Information Systems designed specifically for managing the marketing aspects of the business.

- *Office Automation Systems (OAS)* support communication and productivity in the enterprise by automating work flow and eliminating bottlenecks. OAS may be implemented at any and all levels of management.
- *School Information Management Systems* (SIMS) cover school administration,and often including teaching and learning materials.
- *Enterprise Resource Planning* facilitates the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders.

Advantages

The following are some of the benefits that can be attained for different types of MISs.[10]

- Companies are able to highlight their strengths and weaknesses due to the presence of revenue reports, employees' performance record etc. The identification of these aspects can help the company improve their business processes and operations.
- Giving an overall picture of the company and acting as a communication and planning tool.
- The availability of customer data and feedback can help the company to align their business processes according to the needs of the customers. The effective management of customer data can help the company to perform direct marketing and promotion activities.
- MISs can help a company gain a competitive advantage. Competitive advantage is a firm's ability to do something better, faster, cheaper, or uniquely, when compared with rival firms in the market.

Enterprise applications

- *Enterprise systems*—also known as *enterprise resource planning (ERP)* systems—provide integrated software modules and a unified database that personnel use to plan, manage, and control core business processes across multiple locations. Modules of ERP systems may include finance, accounting, marketing, human resources, production, inventory management, and distribution.
- *Supply chain management (SCM)* systems enable more efficient management of the supply chain by integrating the links in a supply chain. This may include suppliers, manufacturers, wholesalers, retailers, and final customers.
- *Customer relationship management (CRM)* systems help businesses manage relationships with potential and current customers and business partners across marketing, sales, and service.

- *Knowledge management system (KMS)* helps organizations facilitate the collection, recording, organization, retrieval, and dissemination of knowledge. This may include documents, accounting records, unrecorded procedures, practices, and skills. Knowledge management (KM) as a system covers the process of knowledge creation and acquisition from internal processes and the external world. The collected knowledge is incorporated in organizational policies and procedures, and then disseminated to the stakeholders.