Roll No…………….   **Maximum Marks - 100**

Total No. of Questions - 6   **Total No. of Printed Pages -1**

Time Allowed - 3 Hours

Marks
Attempt all questions.

1.

   a) Explain the business perspective of information system in an organization.   **10**

   b) Explain an expert system with its benefit and limitation.   **(2+4+4=10)**

Answer:

a) Information system has become an integrated part of our daily business activities such as accounting, finance, operations management, marketing, human resource management, or any other business function. Information systems and technologies are vital components of successful business and organization—some would say they are business imperatives. They thus constitute an essential field of study in business administration and management, which is why most business majors include a course in information systems. Since you probably intend to be a manager, entrepreneur, or business professional, it is just as important to have a basic understanding of information systems as it is essential as any other functional area in business.

Information technologies, including Internet-based information systems, are playing vital and expanding roles in business. Information technology can help all kinds of business improve the efficiency and effectiveness of their business processes, managerial decision making, and workgroup collaboration, which strengths their competitive positions in rapidly changing marketplaces. This benefit occurs whether the information technology is used to support product development teams, customer support processes, e-commerce transactions, or any other business activity. Information technologies and systems are, quite simply, an essential ingredient for business success in today's dynamic global environment.

While there are seemingly endless numbers of software applications, there are three fundamental reasons for all business applications of information technology. They are found in the three vital roles that information systems can perform for a business enterprise:
- Support of business processes and operations
- Support of business decision making
- Help provide competitive advantages.

<u>Support of business processes and operations:</u> involves dealing with information systems that support the business processes and operations in a business. For example, most retail stores now use computer based information system help their employees record customer purchases, keep track of inventory, pay employees, buy new merchandise, and evaluate sales trends. Store operations would grind to a halt without the support of such information systems.

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Support of Business decision making: Information systems also help store managers and other business professionals make better decisions. For example, decisions about what lines of merchandise need to be added or discontinued and what kind of investments they require are typically made after an analysis provided by computer-based information systems. This function not only supports the decision making of store managers, buyers and others, but it also helps them look for ways to gain an advantage over other retailers in the competition for customers.

Support Competitive Advantage: For decision makers to gain a strategic advantage over competitors innovative use of information technology is required. For example, store management might make a decision to install to touch–screen kiosks in all stores, with links to the e-commerce web site for online shopping. This offering might attract new customers and build customer loyalty because of the ease of shopping and buying merchandise provided by such information systems. Thus, strategic information systems can help provide products and services that give a business a comparative advantage over its competitors.

b) One of the most practical and widely implemented applications of artificial intelligence in business is the development of expert systems and other knowledge-based information systems. A knowledge based information system (KBIS) adds a knowledge base to the major components found in other types of computer based information systems. An expert system (ES) is a knowledge-based information system that uses its knowledge about a specific, complex application area to act as expert consultant to its users. Expert systems provide answers to questions in a very specific problem area by making human like inferences about knowledge contained in a specialized knowledge base. They must also be able to explain their reasoning process and conclusions to a user, so expert systems can provide decision support to end users in the form of advice from an expert consultant in a specific problem area.

Benefits of Expert Systems
An expert system captures the expertise of an expert or group of experts in a computer-based information system. Thus, it can outperform a single human expert in many problem situations. That's because an expert system is faster and more consistent, can have the knowledge of several experts, and does not get tired or distracted by overwork or stress. Expert systems also help preserve and reproduce the knowledge of experts. They allow a company to preserve the expertise of an expert before she/he leaves the organization. This expertise can then be shared by reproducing the software and knowledge base of the expert system.

Limitations of Expert Systems
The major limitations of expert systems arise from their limited focus, inability to learn, maintenance and developmental cost. Expert systems excel only in solving specific types of problems in a limited domain of knowledge. They fail miserably in solving problems requiring a broad knowledge base and subjective problem solving. They do well with specific types of operational or analytical tasks but falter at subjective managerial decision making.
Expert systems may also be difficult and costly to develop and maintain. The costs of knowledge engineers, lost expert time, and hardware and software resources may be too high to offset the benefits expected from some applications. Also, expert systems can't maintain themselves; that is, they can't learn from experience but instead must be taught

new knowledge and modified as new expertise is needed to match developments in their subject areas.

Although there are practical applications for expert systems, applications have been limited and specific because, as discussed, expert systems are narrow in their domain of knowledge. An amusing example of this is the user who used an expert system designed to diagnose skin diseases to conclude that his rusty old car had likely developed measles. Additionally, once some of the novelty had worn off, most programmers and developers realized that common expert systems were just more elaborate versions of the same decision logic used in most computer programs. Today, many of the techniques used to develop expert systems can now be found in most complex programs without any fuss about them.

2.
   a) How can you plan information system strategy with the business strategy of your organization?   **5**
   b) What are the challenges and opportunities associated with the information technology?   **5**
   c) Explain the various dimensions of the feasibility during the process of system development.   **5**
   d) Why do you think that a complete and systematic life cycle should be followed while developing an information system? What are the phases of SDLC?   **(2+3=5)**

Answer:

a) Information system and organization influence one another. Information system is build by managers to serve the interest of the business organization and at the same time organization should be open to the influences of information systems to benefit from new technologies.

A business form has specific strategy plans for specific periods of time to achieve some specific goals. Information system of the organization is that integrated computerized tool which provides right information at the right time on a click. Thus the development and deployment of information should be in line with the strategy of the firm. Information system manager should understand how it can change the social and work life in the form. So Information system manager should have clear idea what type of system needs to be built, what it will do and how it will be implemented.

While planning the information system strategy other things to be considered are the consequences that might be brought out after the implementation e.g. reduction of human resources, cutting of jobs, need of expert manpower and need of new equipment.

Points to be considered while planning information system strategy with the business strategy are thus:
   a. Business Environment
   b. Organizational Culture
   c. Organizational Structure
   d. Business Process
   e. Internal Politics
   f. Management Decision Making process

b) Information technology brings lots of opportunities for the modern business from the prospects of the optimization of resources, communication and decision-making. However it is not free of severe challenges during the process of deployment and operations. Some

of the challenges that Information Technology encounters during the process of implementation and operation can be listed as:

- As the new technology it needs to have the trained manpower for the operation and maintenance
- People expect it as the complete solution and they fully rely on IT as the solution to their problem. They couldn't think that it is just a tool to make the analysis and its us human beings who need to make the decision with its help.
- Unclear government rules and regulations about the legalities and securities of the data and electronics transactions.
- High investment cost on infrastructures, data migration and trainings.
- Employees' reluctances to migrate from their manual working procedures to the computerized procedures.

Similarly the opportunities that Information Technology brings in the modern business can be listed as:
- It provides the relevant information on click, which help in overall operation, managerial activities and formulation strategy of the organization.
- It can reduce the number of working staff.
- Provides the quick means of communications among all the personnel located in different places.
- Although the initial investment would be higher however operation cost is lower which ultimately lead to return on the overall investment.
- Provides easy and quick access to the huge amount of data for future references and analysis.

c) Various dimensions of feasibility can be summarized as:
- Technical feasibility
- Economic feasibility
- Operational feasibility
- Schedule feasibility
- Legal feasibility

Technical feasibility:
Technical feasibility is concerned with the hardware and software system involved. The technical feasibility issues are as follows:
- Is the essential technology available to do the task?
- Does the proposed equipment have the technical capacity to hold the data?
- Does the proposed system provide adequate responses to the inquiries regardless of the number of users?
- Does the system have scalability feature?
- Does the system provide the data security, reliability and ease of access?

Economic feasibility:
Economical feasibility is concerned about the incremental costs and benefits expected if the proposed system is implemented. Various financial and economical concerns during the system analysis and development phases are:
- Cost of conducting full system.
- Cost of technology.

- Benefits in terms of reduced costs.

Schedule Feasibility:

Schedule feasibility focus itself on the time frame for needed for the development of new system and make it operational. It also evaluates the promptness of the service provided after the implementation of the new system.

Legal Feasibility:

Analysis of any possible conflict between newly proposed system and the legal obligations of the organizations existing system is the main concern of the legal feasibility. For example, the new system should comply with all applicable federal and state statutes about financial reporting requirements as well as the company's contractual obligations.

d) An Information system developed for an organization is for all the members of the organization and it is for long run of the organization. It should be able to cater the need of staff of all levels. If proper process is not followed some part of the system will lack essential features which results in the deficiency in operation or people may not own it. Sometimes if the complete process is not followed it may lack the essential report generating process or generated report would miss essential part. Moreover, the rework of the system would be financially very costly. Thus to avoid such deficiency, the design and development phase of system should take complete and should follow the systematic life cycle.

The essential phases of system development life cycle:

a. Requirement Analysis
b. Feasibility Study
c. System Design
d. System Development
e. Testing
f. System Deployment
g. System Maintenance and Support

3.
a) Explain the steps of building of E-R diagram.   **5**

b) Explain the parameters which should be considered seriously while designing the output or generating the report of an information system.   **5**

c) Describe about the prototyping method of system development.   **5**

Answer:

a) The Steps of building of E-R diagram are as follows:

- Determine the data entities.
- Generate a list of potential entity relationships or pairings.
- Determine the relationship between the entity and pairings.
- Analyze the significant entity relationships.
- Develop an integrated E-R diagram.
- Define and group the attributes for each data entity.

b) The essential parameters to be considered while designing the output of a system are as follows:

- Content
- Timeliness
- Format

- Media
- Form
- Volume

Content:
It refers to the actual information to be given to the user of the system. The content should be according to the hierarchical user of management. The content should be very precise and free of unessential information.

Timeliness:
Information arrived after the required time has no use. So time is very essential factor of output. It is related with the time/interval at which the required information to be dissipated to the user.

Format:
It is the arrangement of information on the report. The tabular or graphical is some example of presenting information to the user.

Media:
It refers to the actual physical accessories at which the output information is presented. For the output design the media are the monitor, printed documents, tapes.

Form:
Form in output design is related with way the information is presented. Sometime people may confuse with the format. Format may be the voice, video or text by which the information is dissipated.

c) This is one of the approaches of software development system. This is used to develop a system more quickly than the traditional method. The goal of prototyping approach is, initially, to develop a small or pilot version called a prototype of part or all of a system. This is a usable system or system component that is built quickly and at a lesser cost with intention of being modified and replaced by a full scale and fully operational system. As users work with the prototype, they make suggestions about the ways to improve it. These suggestions are then incorporated into another prototype, which is also used and evaluated, and this process is repeated until a satisfactory system is developed. Finally, when a prototype is developed that satisfies all user requirements, either it is refined and turned into the final system or it is scrapped. If it is scrapped, the knowledge gained from building the earlier prototype is used to develop the real system. Experimenting with prototype helps users to identify additional requirements and needs that they might have overlooked or forgotten to mention. The users will also have a clearer visual picture of what the final version will look like.

4.
   a) What do you understand by E-commerce? Explain how Sales Force Automation changes the sales process. **(3+4=7)**

   b) What do you mean by ERP? What are its functional areas? **(2+6=8)**

Answer:

a) e-Commerce is the process of trading the service and product with the help of internet. Internet provides an easier way to link businesses and individuals at a very low cost. With the development of e-commerce trading partners can directly communicate with each other, bypassing intermediate and inefficient multilayered procedures.

With the wide range of use of Internet people can use it to sell its service and product making it available at any part of the world by sitting at their home. Websites (e.g.

www.amazon.com, www.ebay.com, www.munchahouse.com) are available to the seller or consumer 24 hours a day, thus the business is possible throughout the day.

Sales force management systems are <u>information systems</u> used in <u>marketing</u> and <u>management</u> that help to automate some <u>sales</u> and <u>sales force management</u> functions. They are frequently combined with a <u>Marketing Information System</u>, in which case they are often called <u>Customer Relationship Management</u> (CRM) systems.

A Sales Force Automation System (SFA), typically a part of a company's <u>customer relationship management</u> system, is a system that automatically records all the stages in a sales process. SFA includes a <u>contact management system</u> which tracks all contact that has been made with a given customer, the purpose of the contact, and any follow up that might be required. This ensures that sales efforts are not duplicated, reducing the risk of irritating customers. SFA also includes a <u>sales lead tracking system</u>, which lists potential customers through paid phone lists, or customers of related products. Other elements of an SFA system can include <u>sales forecasting</u>, <u>order management</u> and <u>product knowledge</u>. More developed SFA systems have features where customers can actually model the product to meet their required needs through online product building systems. This is becoming more and more popular in the automobile industry, where patrons can customize various features such as color and interior features such as leather vs. upholstered seats.

An integral part of any SFA system is companywide integration among different departments. If SFA systems aren't adopted and properly integrated to all departments, there might be a lack of communication that could result in different departments contacting the same customer for the same purpose. In order to mitigate this risk, SFA must be fully integrated in all departments that deal with customer service management.

b) Enterprise resource planning (ERP) software is a group of programs and functions integrating all the functional business information modules into one system. ERP is thus a cross-functional enterprise system, which the data information is exchanged among various departments without any hindrances. For example, it integrates corporate accounting and resource management with production schedules and customer orders. It deploys integrated approach of information system of all the functional areas of the organization. ERP helps all level of organizational staffs in proper utilization of man, machine and money.

Its functional areas of implementations are as:

Production Planning

This module is used in production planning optimizes the utilization of manufacturing capacity, parts, components and material resources using historical production data and sales forecasting.

Purchasing:

Purchase module streamlines procurement of required raw materials. It automates the processes of identifying potential suppliers, negotiating price, awarding purchase order to the supplier, and billing processes.

Inventory Control:

Inventory module facilitates processes of maintaining the appropriate level of stock in a warehouse. The activity of inventory control involves identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status. Integration of inventory

control module with sales, purchase, finance modules allows ERP systems to generate vigilant executive level reports.

ERP Sales Module

Revenues from sales are lifeblood for commercial organizations. Sales module implements functions of order placement, order scheduling, shipping and invoicing. Sales module is closely integrated with organizations' ecommerce websites. Many ERP vendors offer online storefront as part of the sales module.

ERP Marketing Module

ERP marketing module supports lead generation, direct mailing campaign and more.

ERP Financial Module

The financial module is the core of many ERP software systems. It can gather financial data from various functional departments, and generates valuable financial reports such balance sheet, general ledger, trail balance, and quarterly financial statements.

ERP HR Module

HR module streamlines the management of human resources and human capitals. HR modules routinely maintain a complete employee database including contact information, salary details, attendance, performance evaluation and promotion of all employees.

5.
   a) Describe the role of IS auditor with respect to   **(4+4=8)**

   i) Physical access controls

   ii) Environmental controls

   b) Why is disaster recovery plan necessary for critical system? Describe clustering technique in brief.   **(4+3=7)**

Answer:

a)

1) **Role of IS Auditor in Physical Access Controls:** Auditing Physical Access requires the auditor to review the physical access risk and controls to form an opinion on the effectiveness of the physical access controls. This involves the following:

Risk Assessment: The auditor must satisfy himself that the risk assessment procedure adequately covers periodic and timely assessment of all assets, physical access threats, vulnerabilities of safeguards and exposures there from.

Controls Assessment: The auditor based on the risk profile evaluates whether the physical access controls are in place and adequate to protect the IS assets against the risks.

Planning for review of physical access controls: It requires examination of relevant documentation such as the security policy and procedures, premises plans, building plans, inventory list and cabling diagrams.

Testing of Controls: The auditor should review physical access controls to satisfy for their effectiveness. This involves:

- Tour of organizational facilities including outsourced and offsite facilities.
- Physical inventory of computing equipment and supporting infrastructure.
- Interviewing personnel can also provide information on the awareness and

knowledge of procedures.

- Observation of safeguards and physical access procedures. This would also include inspection of:

  - Core computing facilities.
  - Computer storage rooms.
  - Communication closets.
  - Backup and off site facilities.
  - Printer rooms.
  - Disposal yards and bins.
  - Inventory of supplies and consumables.

- Review of physical access procedures including user registration and authorization, authorization for special access, logging, review, supervision etc. Employee termination procedures should provide withdrawal of rights such as retrieval of physical devices like smart cards, access tokens, deactivation of access rights and its appropriate communication to relevant constituents in the organization.
- Examination of physical access logs and reports. This includes examination of incident reporting logs and problem resolution reports.

2) **Role of Auditor in Environment Controls:**

The attack on the World Trade Centre in 2001 has created a worldwide alert bringing focus on business continuity planning and environmental controls. Audit of environment controls should form a critical part of every IS audit plan. The IS auditor should satisfy not only the effectiveness of various technical controls but that the overall controls assure safeguarding the business against environmental risks. Some of the critical audit considerations that an IS auditor should take into account while conducting his audit are given below:

Audit Planning and Assessment: As part of risk assessment:

- The risk profile should include the different kinds of environmental risks that the organization is exposed to. These should comprise both natural and man-made threats. The profile should be periodically reviewed to ensure updates with newer risk that may arise.
- The controls assessment must ascertain that controls safeguard the organization against all acceptable risks including probable ones and are in place.
- The security policy of the organization should be reviewed to access policies and procedures that safeguard the organization against environmental risks.
- Building plans and wiring plans need to be reviewed to determine the appropriateness of location of IPF, review of surroundings, power and cable wiring etc.
- The IS Auditor should interview relevant personnel to satisfy himself about employees' awareness of environmental threats and controls, role of the interviewee in environmental control procedures such as prohibited activities, incident handling, and evacuation procedures to determine if adequate incident reporting procedures exist.
- Administrative procedures such as preventive maintenance plans and their implementation, incident reporting and handling procedures, inspection and testing plan and procedures need to be reviewed.

b) A disaster is something that occurs without any previous warning or signal. So, for business critical information systems, there has to be appropriate and rigorous

mechanism to ensure continuity of the operation as well as quick recovery of data/system in case of discontinuity. The disaster may be less severe such as network disconnection, limited system outage, a partial hardware failure to very sever such as total site failure due to man-made or natural cause. The major focus of the disaster recovery plan has to be how to restore the system functionality and recover the data in such cases.

In the absence of such plan, an incident may lead to service outage, data loss and subsequent impact on revenue, market image, competitiveness and overall continuity of the corporate ecosystem. In the age of information, security, integrity and availability of the information and information system are of most critical importance. This means, a good disaster recovery plan has to be at the cornerstone of any information system deployment.

Clustering technique is a technique in which a information system server is designed in such a way that the data and application are replicated in more than one physical system. The system is designed in such a way that the system availability and data security is guaranteed even if a number of servers, network equipment or storage devices fail. The switchover from one equipment to another is automatic and does not need human intervention in a good clustered system.

6. Write short notes on the following: (5×3=15)
   a) Economic feasibility
   b) Preventive controls
   c) High availability
   d) Need of flexibility to change in business information system
   e) Consultant level role of IT professional

Answer:

a) **Economic Feasibility:** It includes an evaluation of all the incremental costs and benefits expected if the proposed system is implemented. This is the most difficult aspect of the study. The financial and economic questions raised by analysts during the preliminary investigation are for the purpose of estimating the following:

   a. The cost of conducting a full systems investigation.
   b. The cost of hardware and software for the class of applications being considered.
   c. The benefits in the form of reduced costs or fewer costly errors.
   d. The cost if nothing changes (i.e., the proposed system is not developed)
   e. The procedure employed is the traditional cost-benefit study.

b) **Preventive Controls:** Preventive controls are those inputs, which are designed to prevent an error, omission or malicious act occurring. An example of a preventive control is the use of passwords to gain access to a financial system. The broad characteristics of preventive controls are:

   (i) A clear-cut understanding about the vulnerabilities of the asset
   (ii) Understanding probable threats
   (iii) Provision of necessary controls for probable threats from materializing

Any control can be implemented in both a manual and computerized environment for the same purpose. Only, the implementation methodology may differ from one to another case. The major features of such control are:

- ⬚ Employ qualified personnel

- ⬚ Segregation of duties

- ⬚ Access control

- ⬚ Documentation

- ⬚ Prescribing appropriate books for a course

- ⬚ Training and retraining of staff

- ⬚ Authorization of transaction

- ⬚ Validation, edit checks in the application

- ⬚ Firewalls

- ⬚ Anti-virus software (sometimes this acts like a corrective control also), etc

- ⬚ Passwords

c) High availability computing is a mechanism to implement a computing platform to make sure that the data and application are available in normal network and power outage scenarios. To make this happen, the system is replicated into two or more identical installation, probably at different geographical regions. It also involves redundancy of networks and power systems. Apart from that, another major technique is server replication and clustering within a site or between two distant sites so that the system continues to perform with automatic switchover from one unit to another in the event of unavailability of the first node. Simply put, high availability computing technique tries to ensure that the services and data are available in normally disruptive situations such as power outages, network disconnections or other disaster.

d) Need of flexibility to change in business information system

An information system is a system that manages information and data critical to the business organization or any other corporate. In the modern computerized world, almost all the organizational activities revolve around computerized information system. Such system need to be able to fulfill all the information needs of the organization in a continued manner. Since the type, nature, importance and usability of the information and its delivery mechanism changes with time, the system that manages and delivers information needs also to be flexible to absorb all or most of those changes. Otherwise, the information system itself becomes less and less useful, finally becoming obsolete and replaced by a new system. However, replacing existing system with the new one needs a lot of investment and effort. So, to avoid this, the information system must be designed and developed with a lot of foresight and planning so that it is flexible enough to absorb necessary changes and prolong its own viability for the organization. This saves money, ensures long continuation and avoids unnecessary effort to change systems frequently.

e) **Consultant level role of IT professional**

Consultant level role is perhaps the highest and most abstract role of IT professional in

an organization. Such roles are normally short term, highly focused, well-defined and limited to a particular project or task. Because of such focused responsibility, consultants are supposed to be top experts in that particular area and capable to provide important suggestions and counsel to the organization in the pre-defined time frame. Consultants are normally hired at the design or deployment stages of the information system. Consultant at the design stage normally provides information related to the system design aspects such as feasibility, architectural layout, development plans etc. A consultant working at the deployment phase provides inputs to the implementation team to enable them to make timely and effective deployment while keeping in mind the expected goals of the system. Consultant level role hence normally involves a critical study of the process and system and presentation of constructive ideas and suggestions to the major stakeholders of the system being designed, developed or deployed. Consultants may also be hired in cases where a system needs to be discontinued and replaced by a new one.