Information Management System (17IS753)
VTU question paper and solution
B.E. Degree Examination,January 2021

Q1(a). What is an Information System? What are the classification of Information system? Explain

An **Information System (IS)** can be any organized combination of people, hardware, software, communication networks, and data resources that stores and retrieves, transforms and disseminates information in an organization.

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 its business processes and operations.
Support of decision making by its employees and managers.
Support of its strategies for competitive advantage.

FIGURE 1.5 Operations and management classifications of information systems. Note how this conceptual overview emphasizes the main purposes of information systems that support business operations and managerial decision making.
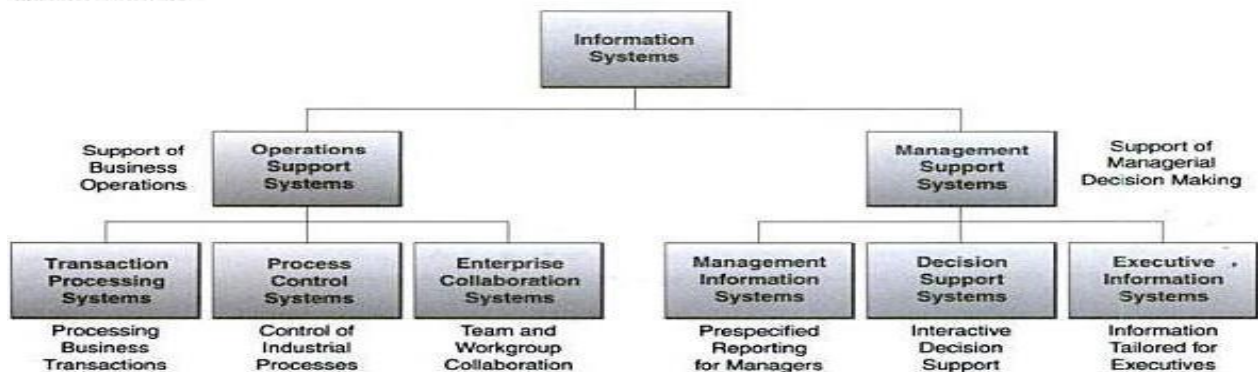
Q1(b). Explain Components of information systems?

FIGURE 1.15
The components of an information system. All information systems use people, hardware, software, data, and network resources to perform input, processing, output, storage, and control activities that transform data resources into information products.
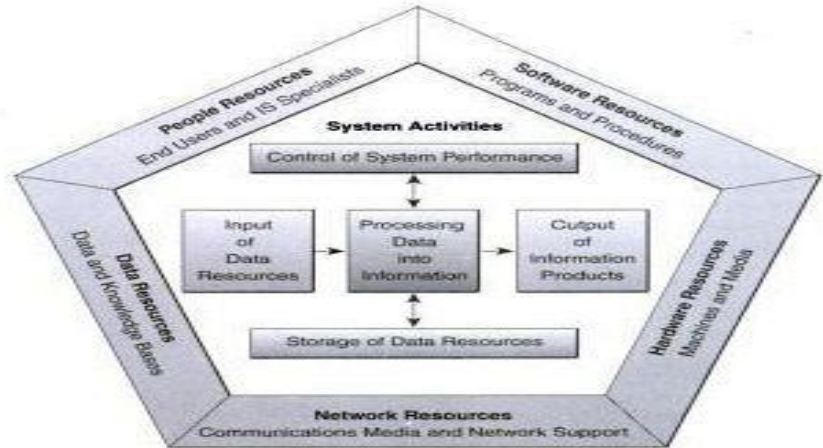
## Q1 (c) What is system? Explain cybernetic system?

A system is a set of interrelated components, with a clearly defined boundary, working together to achieve a common set of objectives. Dynamic system has three basic interacting components or functions:

- Input involves capturing and assembling elements that enter the system to be processed
- Processing involves transformation processes that convert input into output.
- Output involves transferring elements that have been produced by a transformation process to their ultimate destination.

The system concept becomes even more useful by including two additional components: feedback and control. This is called as a cybernetic system, that is, self-monitoring and self-regulatory.

- Feedback is data about the performance of a system.
- Control involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of its goal.

FIGURE 1.13   A common cybernetic system is a home temperature control system. The thermostat accepts the desired room temperature as input and sends voltage to open the gas valve which fires the furnace. The resulting hot air goes into the room and the thermometer in the thermostat provides feedback to shut the system down when the desired temperature is reached.
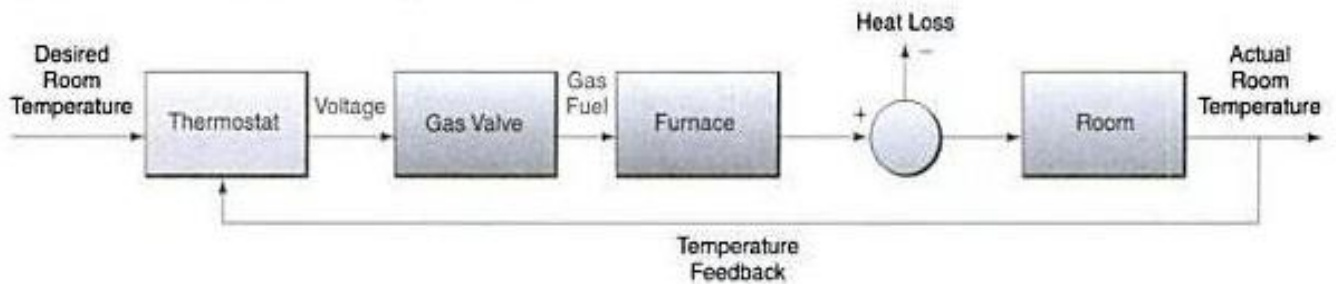

Q2(a) How a Bussiness uses internet technologies to form a virtual company and alliance with Bussiness partner?

A virtual company (*virtual organisation or virtual corporation*) is an organisation that uses IT to link people, organisations, assets and ideas. It has also developed alliances and extranet links that form

2

interenterprise information systems with suppliers, customers, subcontractors, and competitors. Thus, virtual companies create flexible and adaptable virtual workgroups and alliances keyed to exploit fast-changing business opportunities.

FIGURE 2.11 A virtual company uses the Internet, intranets, and extranets to form virtual workgroups and support alliances with business partners.
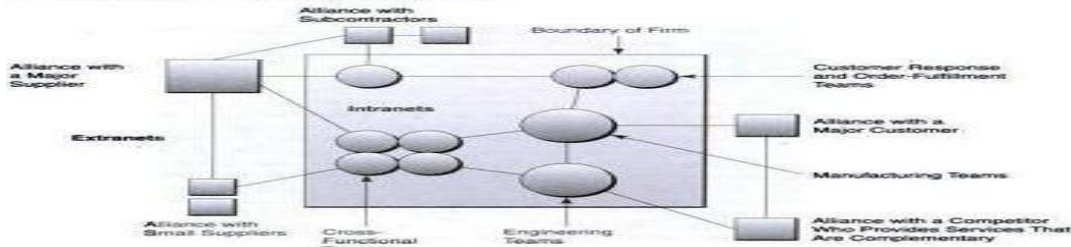
Virtual Company Strategies
- Share infrastructure and risk with alliance partners.
- Link complementary core-competencies.
- Reduce concept-to-cash time through sharing.
- Increase facilities and market coverage.
- Gain access to new markets and share market or customer loyalty
- Migrate from selling products to selling solutions.

Q2(b) Explain competitive strategies and competitive forces that appear in the market places.

FIGURE 2.1
Businesses can develop competitive strategies to counter the actions of the competitive forces they confront in the marketplace.
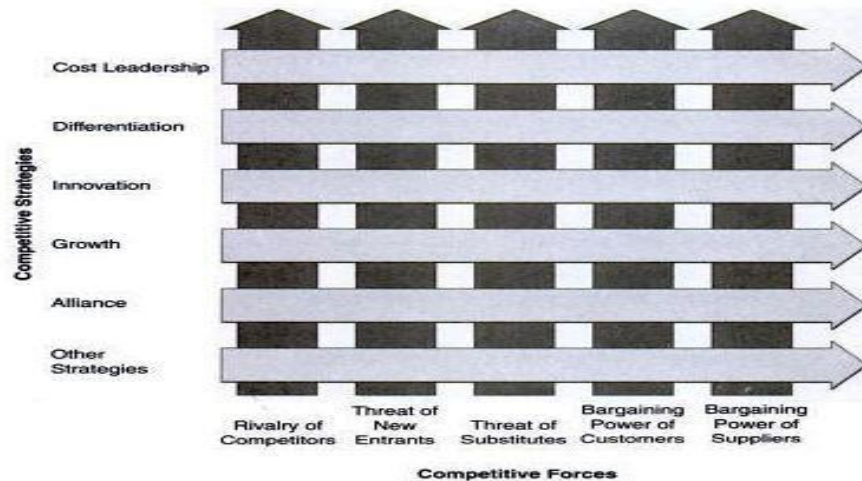
Competitive Forces and Strategies A company can survive and succeed in the long run only if it successfully develops strategies to confront five **competitive forces** that shape the structure of competition in its industry. Any business that wants to survive and succeed must develop and implement strategies to effectively counter
- The rivalry of competitors within its industry
- The threat of new entrants into an industry and its markets
- The threat posed by substitute products which might capture market share
- The bargaining power of customers
- The bargaining power of suppliers

3

The Competitive Advantage of IT
Businesses can counter the threats of competitive forces that they face by implementing five basic **competitive strategies**

- **Cost Leadership Strategy.** Becoming a low-cost producer of products and services in the industry, or finding ways to help its suppliers or customers to reduce their costs or to increase the cost of their competitors.
- **Differentiation Strategy.** Developing ways to differentiate a firm's products and services from its competitors' or reduce the differentiation advantages of competitors.
- **Innovation Strategy.** Finding new ways of doing business. This may involve the development of unique products and services, or entry into unique markets or market niches.
- **Growth Strategies.** Significantly expanding a company's capacity to produce goods and services, expanding into global markets, diversifying into new products and services, or integrating into related products and services.
- **Alliance Strategies.** Establishing new business linkages and alliances with customers, suppliers, competitors, consultants, and other companies. These linkages may include mergers, acquisitions, joint ventures, forming of "virtual companies".

Q3(a) Explain enterprise collaboration system and the tools associated with it.

FIGURE 7.6
Electronic communications, conferencing, and collaborative work software tools enhance enterprise collaboration.
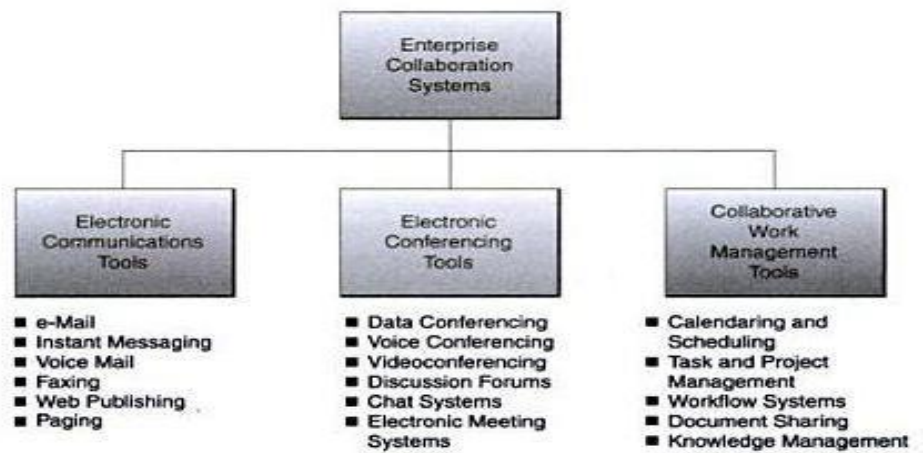
Q3(b) Explain accounting system with neat diagram?

Accounting information systems record and report business transaction and other economic events. Operational accounting systems emphasize legal and historical record-keeping and production of accurate financial statements. It include transaction processing systems such as order processing, inventory control, accounts receivable, and accounts payable, payroll and general ledger systems. Management accounting systems emphasize cost accounting reports, the development of financial budgets and projected financial statements and analytical reports comparing actual to forecasted performance.

FIGURE 7.15 A summary of six essential accounting information systems used in business.

Common Business Accounting Systems

- **Order Processing**
  Captures and processes customer orders and produces data for inventory control and accounts receivable.
- **Inventory Control**
  Processes data reflecting changes in inventory and provides shipping and reorder information.
- **Accounts Receivable**
  Records amounts owed by customers and produces customer invoices, monthly customer statements, and credit management reports.
- **Accounts Payable**
  Records purchases from, amounts owed to, and payments to suppliers, and produces cash management reports.
- **Payroll**
  Records employee work and compensation data and produces paychecks and other payroll documents and reports.
- **General Ledger**
  Consolidates data from other accounting systems and produces the periodic financial statements and reports of the business.
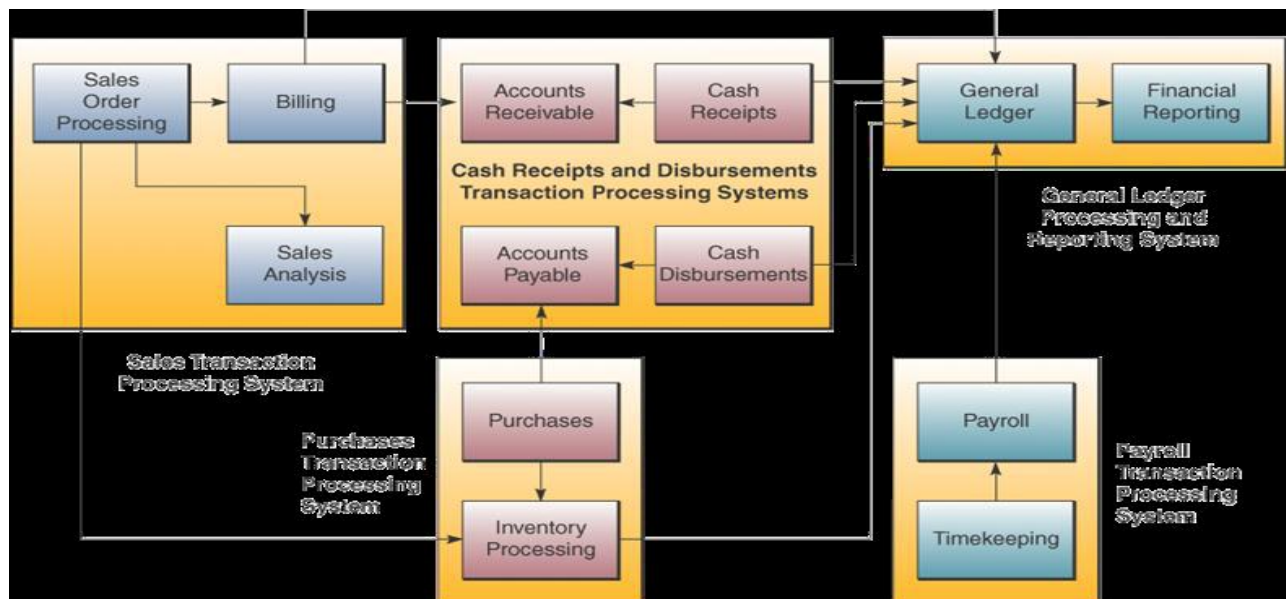
Q3(c) Explain enterprise architecture?
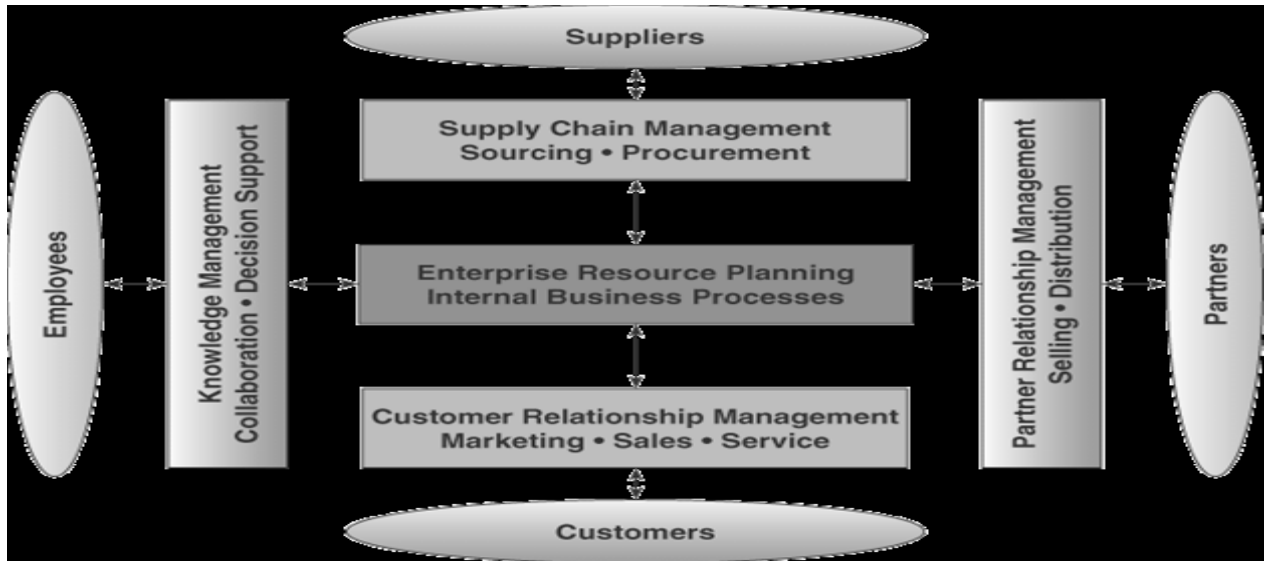
The fig above presents an Enterprise application Architecture ,which illustrates the interrelationships of the major cross-functional applications.

o Provides a conceptual framework which helps to visualize the basic components, processes, and interfaces of major e-business applications.

o Focuses on accomplishing fundamental business processes in concert with Customers, Suppliers, Partners, employee stakeholders.

o Thus, Enterprise Resource Planning

Q4(a) Explain CRM

CRM uses information technology to create a cross-functional enterprise system that integrates and automates many of the *customer serving* processes in sales, marketing, and customer services that interact with a company's customers.

☐ CRM systems also create an IT framework of Web-enabled software and databases that integrates these processes with the rest of a company's business operations.

☐ CRM systems include a family of software modules that provides the tools that enable a business and its employees to provide fast, convenient, dependable, and consistent service to its customers.

☐ Examples – Siebel systems, Oracle, PeopleSoft, SAP AG, Epiphany

FIGURE 8.1
The major application clusters in customer relationship management.

6
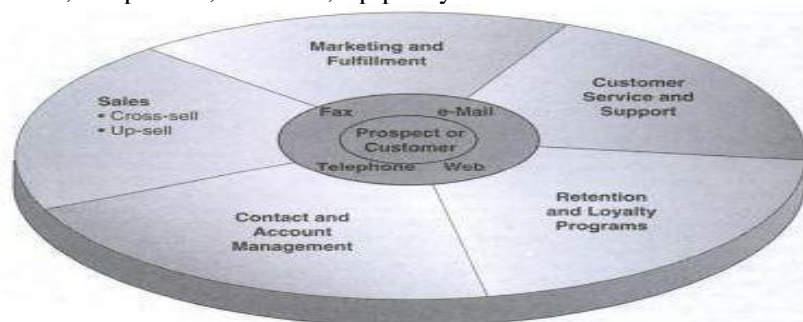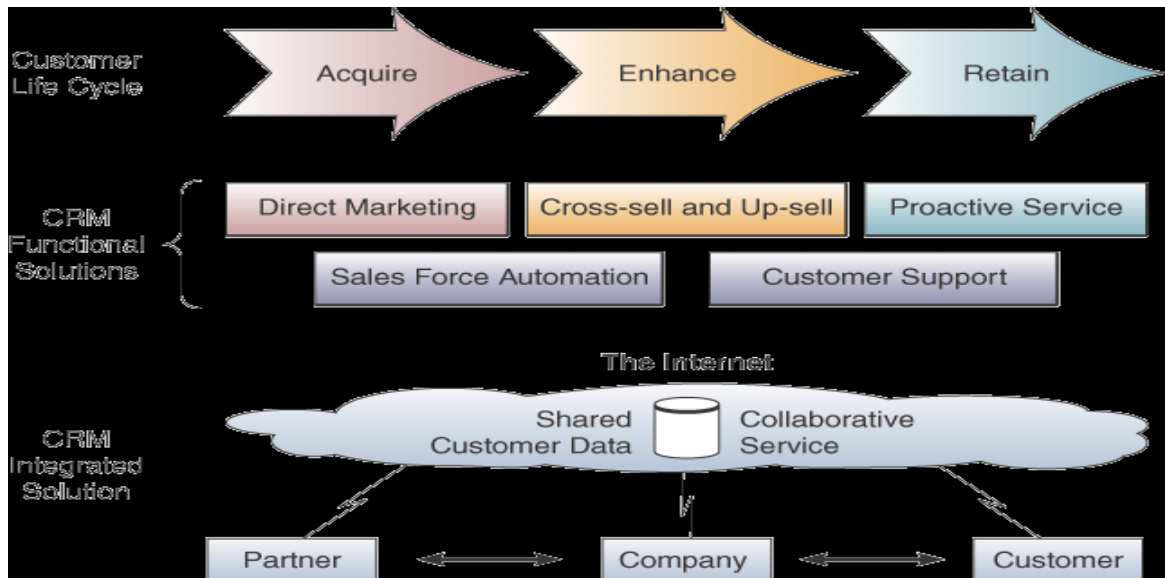
Benefits and Challenges of CRM

□ **Benefits**

□ CRM allows a business to identify and target their best customers so they can be retained as lifelong customers for greater and more profitable services.

□ It makes possible real-time customisation and personalisation of products and services based on customer wants, needs, buying habits and life cycles.

□ CRM can also keep track of when a customer contacts the company.

□ CRM systems can enable a company to provide a consistent customer experience and superior service and support.

□ **Challenges / Failures**

□ According to some research and surveys, 50% of CRM projects did not produce proper results, 20% of them damaged customer relationships etc.

□ Research shows that lack of understanding and preparations are major reasons.

□ In many cases, failed CRM projects were implemented without the participation of the business stakeholders involved.

□ Employees and customers were not prepared for the new processes or challenges that were part of the new CRM implementation.

Q4(b) Explain ERP

Enterprise resource planning is a cross-functional enterprise system driven by an integrated suite of software modules that supports the basic internal business processes of a company.

FIGURE 8.5
The major application components of enterprise resource planning demonstrate the cross-functional approach of ERP systems.
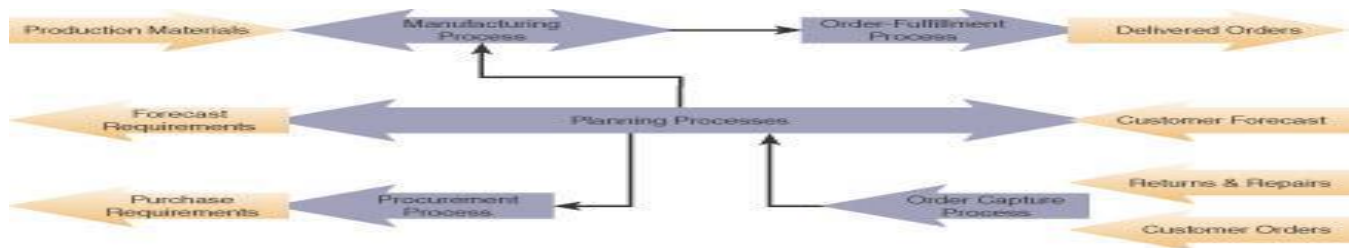
Quality and Efficiency. ERP creates a framework for integrating and improving a company's internal business processes that result in significant improvements in the quality and efficiency of customer service, production and distribution.

 Decreased Costs. Many companies report significant reduction in transaction processing costs and hardware, software and IT support staff compared to the non-integrated legacy systems that were replaced by their new ERP systems.

 Decision Support. ERP provides vital cross-functional information business performance quickly to managers to significantly improve their ability to make better decisions in a timely manner across the entire business enterprise.

 Enterprise Agility. Implementing ERP systems breaks down many business processes, information systems, and information resources. This results in more flexible organisational structures, managerial responsibilities, and work roles

Q4(c) Explain SCM

Supply chain management is a cross-functional interenterprise system that uses information technology to help support and manage the links between some of a company's key business processes and those of its suppliers, customers and business partners. The goal of SCM is to create a fast, efficient and low-cost network of business relationships, or **supply chain**, to get a company's products from concept to market. A supply chain is also called as a **value chain** since each supply chain process should add value to the products or services a company produces.

FIGURE 8.11
Supply chain management software and Internet technologies can help companies reengineer and integrate the functional SCM processes that support the supply chain life cycle.

8
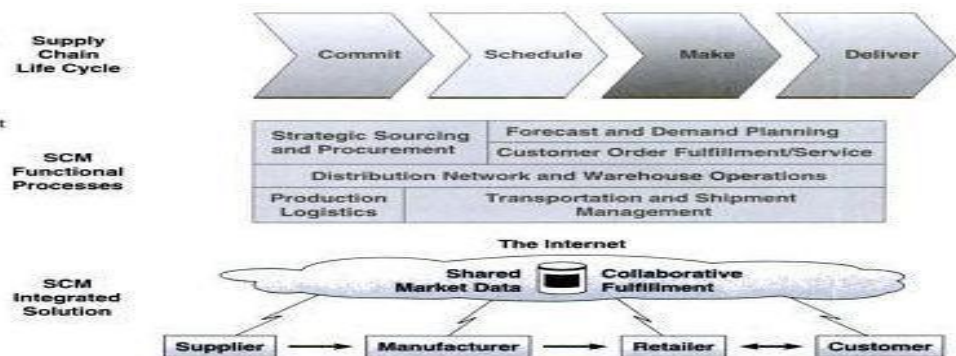
FIGURE 8.13 The objectives and outcomes of supply chain management are accomplished for a business with the help of interenterprise SCM information systems.

SCM Objectives		SCM Outcomes
What? Establish objectives, policies, and operating footprint	Strategic	• Objectives • Supply policies (service levels) • Network design
How much? Deploy resources to match supply to demand	Tactical	• Demand forecast • Production, procurement, logistics plan • Inventory targets
When? Where? Schedule, monitor, control, and adjust production	Operational	• Work center scheduling • Order/inventory tracking
Do Build and transport	Execution	• Order cycle • Material movement

PART B

Q5(a) Explain nine essential categories e-commerce process architecture with a neat diagram.

- **Access Control and Security**

E-commerce processes must establish mutual trust and secure access between the parties in an e-commerce transaction by authenticating users, authorizing access, and enforcing security features

- **Profiling and Personalizing**

Processes can occur that gather data on you and your website behaviour and choices, and build electronic profiles of your characteristics and preferences. These profiles are then used to recognize you as an individual user and provide you with a personalized view of the contents of the site, as well as product recommendations and personalized Web advertising

- **Search Management**

Efficient and effective search processes provide a top e-commerce website capability that helps customers find the specific product or service they want to evaluate or buy

- **Content and Catalog Management**

Content Management – software that helps e-commerce companies develop, generate, deliver, update, and archive text data and multimedia information at e-commerce websites Catalog Management – software that helps generate and manage catalog content

- **Workflow Management**

Software that helps employees electronically collaborate to accomplish structured work tasks within knowledge-based business processes

- **Event Notification**

Software that notifies customers, suppliers, employees, and other stakeholders of their status in a transaction based on events initiated by one of the parties

- **Collaboration and Trading**

Processes that support the vital collaboration arrangements and trading services needed by customers, suppliers, and other stakeholders

9

FIGURE 9.4 This e-commerce process architecture highlights nine essential categories of e-commerce processes.
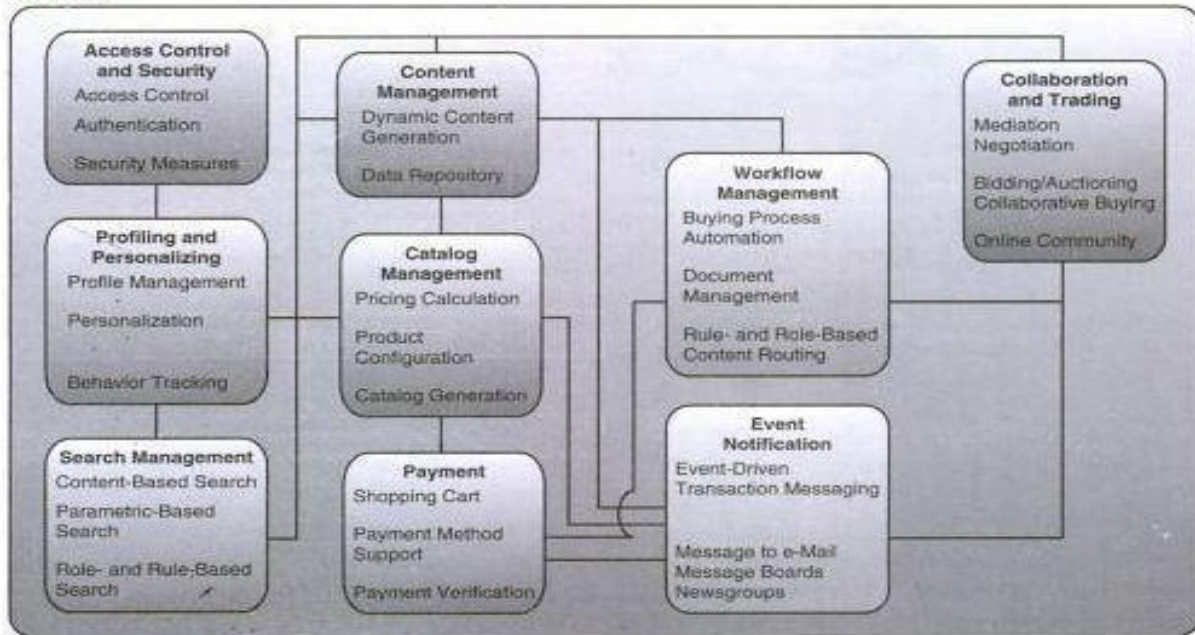
Q5(b) What are e-commerce success factors?

Some of the key factors for success in e-commerce:
  ➢ **Selection and Value** – attractive product selections, competitive prices, satisfaction guarantees, and customer support after the sale
  ➢ **Performance and Service** – fast, easy navigation, shopping, and purchasing, and prompt shipping and delivery.
  ➢ **Look and Feel** – attractive web storefront, website shipping areas, multimedia product catalog pages, and shopping features.
  ➢ **Advertising and Incentives** – targeted web page advertising and e-mail promotions, discounts and special offers, including advertising at affiliate sites. Figure 9.12 compares major marketing communications choices in traditional and e-commerce marketing to support each step of the buying process.
  ➢ **Personal Attention** – personal web pages, personalized product recommendations, Web advertising and e-mail notices, and interactive support for all customers
  ➢ **Community Relationships** – virtual communities of customers, suppliers, company representatives, and others via newsgroups, chat rooms, and links to related sites
  ➢ **Security and Reliability** – security of customer information and website transactions, trustworthy product information, and reliable order fulfilment.

**Q6(a) What is DSS?**

Decision Support System (**DSS**) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization (usually mid and higher management) and help to make decisions, which may be rapidly changing and not easily specified in advance (Unstructured and

10

Semi-Structured decision problems). Decision support systems can be either fully computerized, human or a combination of both

1. DSS tends to be aimed at the less well structured, underspecified problem that upper level managers typically face;
2. DSS attempts to combine the use of models or analytic techniques with traditional data access and retrieval functions;
3. DSS specifically focuses on features which make them easy to use by noncomputer people in an interactive mode; and
4. DSS emphasizes flexibility and adaptability to accommodate changes in the environment and the decision making approach of the user.

Q6(b) Explain Expert system.
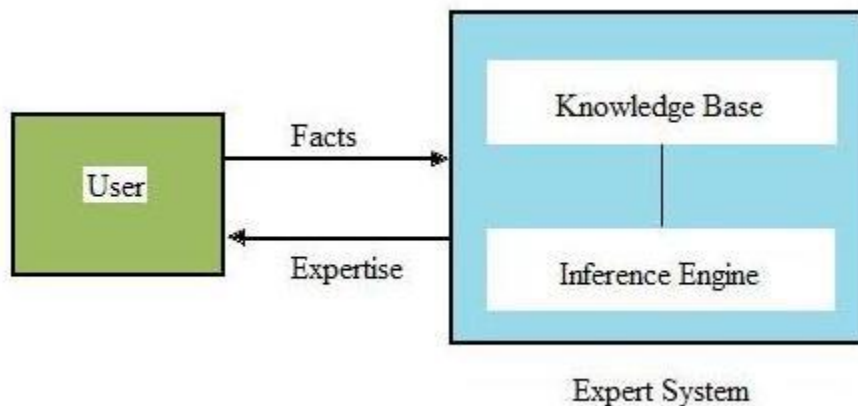
Expert System

The *expert systems* are a branch of AI designed to work within a particular domain. As an expert is a person who can solve a problem with the domain knowledge in hands it should be able to solve problems at the level of a human expert. The source of knowledge may come come from a human expert and/or from books, magazines and internet. As knowledge play a key role in the functioning of expert systems they are also known as knowledge-based systems and knowledge-based expert systems. The expert's knowledge about solving the given specific problems is called knowledge domain of the expert.

Basic Concept of an Expert System Function

The expert system consists of two major components: knowledge base and inference engine.

Knowledge base contains the domain knowledge which is used by the inference engine to draw conclusions. The inference engine is the generic control mechanism that applies the axiomatic knowledge to the task-specific data to arrive at some conclusion. When a user supplies facts or relevant information of query to the expert system he receives advice or expertise in response.

That is given the facts it uses the inference engine which in turn uses the knowledge base to infer the solution.

Q7(a) Explain Hacking? List and explain the commom hacking tactics.

Hacking - The obsessive use of computers, or the unauthorized access and use of networked computer systems. Hackers can be outsiders or company employees who use the Internet and other networks to steal or damage data and programs. A hacker may also use remote services that allow one computer on a network to execute programs on another computer to gain privileged access within a network. **Common Hacking Tactics**

☐ **Denial of Service** – hammering a website's equipment with too many requests for information, effectively clogging the system, slowing performance or even crashing the site

☐ **Scans** – widespread probes of the Internet to determine types of computers, services, and connections

☐ **Sniffer** – programs that covertly search individual packets of data as they pass through the Internet, capturing passwords or entire contents

☐ **Spoofing** – faking an e-mail address or Web page to trick users into passing along critical information like passwords or credit card numbers

☐ **Trojan Horse** – a program that, unknown to the user, contains instructions that exploit a known vulnerability in some software

☐ **Back Doors** – a point hidden point of entry to be used in case the original entry point has been detected or blocked

☐ **Malicious Applets** – tiny programs that misuse your computer's resources, modify files on the hard disk, send fake e-mail, or steal passwords

☐ **War Dialling** – programs that automatically dial thousands of telephone numbers in search of a way in through a modem connection

☐ **Logic Bombs** – an instruction in a computer program that triggers a malicious act

☐ **Buffer Overflow** – a technique for crashing or gaining control of a computer by sending too much data to the buffer in a computer's memory

☐ **Password Crackers** – software that can guess passwords

☐ **Social Engineering** – a tactic used to gain access to computer systems by talking unsuspecting company employees out of valuable information such as passwords

☐ **Dumpster Diving** – sifting through a company's garbage to find information to help break into their computers

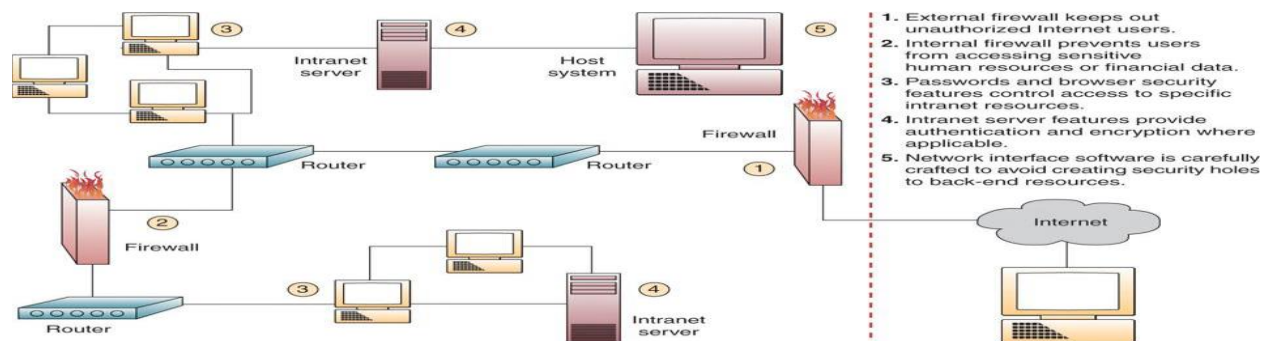**Q7(b) Explain**

Technology ethics

12

FIGURE 13.3   Ethical principles to help evaluate the potential harms or risks of the use of new technologies.

Principles of Technology Ethics

- **Proportionality.** The good achieved by the technology must outweigh the harm or risk. Moreover, there must be no alternative that achieves the same or comparable benefits with less harm or risk.
- **Informed Consent.** Those affected by the technology should understand and accept the risks.
- **Justice.** The benefits and burdens of the technology should be distributed fairly. Those who benefit should bear their fair share of the risks, and those who do not benefit should not suffer a significant increase in risk.
- **Minimized Risk.** Even if judged acceptable by the other three guidelines, the technology must be implemented so as to avoid all unnecessary risk.

Firewall

A network firewall can be a communications processor, typically a *router*, or a dedicated server, along with firewall software.

☐ A firewall serves as "gatekeeper" system that protects a company's intranets and other computer networks from intrusion by providing a filter and safe transfer point for access to and from the Internet and other networks.

☐ It screens all network traffic for proper passwords or other security codes, and allows only authorised transmissions in and out of the network.

☐ Firewall software has become an essential component for individuals connecting to the Internet with DSL or cable modems, because of their vulnerable "always-on" connection status.

☐ Firewalls can deter, but not completely prevent, unauthorised access (hacking) into computer networks.

☐ A firewall may allow access only from trusted locations on the Internet to particular computers inside the firewall. Or it may allow only "safe" information to pass.

☐ In other cases, it is impossible to distinguish safe use of a particular network service from unsafe use and so all requests must be blocked.

☐ The firewall may then provide substitutes for some network services (such as e-mail or file transfers) that perform most of the same functions but are not as vulnerable to penetration.

☐ **FIGURE 13.13** illustrates an Internet/intranet firewall system for a company

1. External firewall keeps out unauthorized Internet users.
2. Internal firewall prevents users from accessing sensitive human resources or financial data.
3. Passwords and browser security features control access to specific intranet resources.
4. Intranet server features provide authentication and encryption where applicable.
5. Network interface software is carefully crafted to avoid creating security holes to back-end resources.

Q8(a) Explain Bussiness IT planning process.

Businesses are moving away from
☐ Multinational strategies where foreign subsidiaries operate autonomously.

13

International strategies in which foreign subsidiaries are autonomous but are dependent on headquarters for new processes, products, and ideas
 Global strategies where a company's worldwide operations are closely managed by corporate headquarters.

In the transnational approach, a business depends heavily on its information systems and Internet technologies to help it integrate its global business activities. A transnational business tries to develop an integrated and cooperative worldwide hardware, software and Internet-based architecture for its IT platform.

Comparing Global Business/IT Strategies		
International	**Global**	**Transnational**
• Autonomous operations.	• Global sourcing.	• Virtual business operations via global alliances.
• Region specific.	• Multiregional.	• World markets and mass customization.
• Vertical integration.	• Horizontal integration.	
• Specific customers.	• Some transparency of customers and production.	• Global e-commerce and customer service.
• Captive manufacturing.	• Some cross regionalization.	• Transparent manufacturing.
• Customer segmentation and dedication by region and plant.		• Global supply chain and logistics.
		• Dynamic resource management.
Information Technology Characteristics		
• Stand-alone systems.	• Regional decentralization.	• Logically consolidated, physically distributed, Internet connected.
• Decentralized/no standards.	• Interface dependent.	• Common global data resources.
• Heavy reliance on interfaces.	• Some consolidation of applications and use of common systems.	• Integrated global enterprise systems.
• Multiple systems, high redundancy and duplication of services and operations.	• Reduced duplication of operations.	• Internet, intranet, extranet Web-based applications.
• Lack of common systems and data.	• Some worldwide IT standards.	• Transnational IT policies and standards.

Q8(b) Explain major components of information technology management.
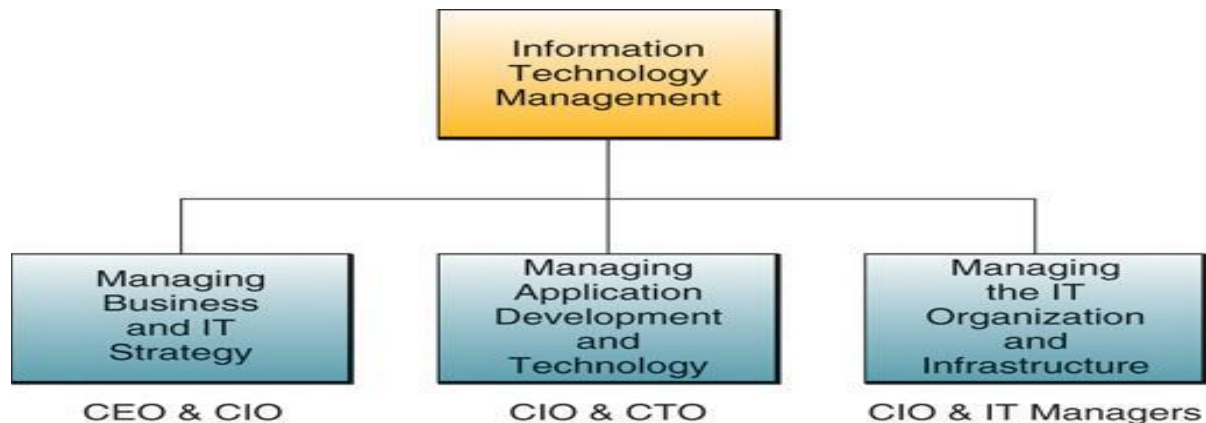
Managing the joint development and implementation of business/IT strategies
Led by the CEO and CIO (chief information officer), proposals are developed by business and IT managers and professionals for using IT to support the strategic business priorities of the company. This business/ IT

planning process *align* IT with strategic business goals. The process also includes evaluating the business case for investing in the development and implementation of each proposed business/IT project.

 Managing the development and implementation of new business/IT applications and technologies

This is the primary responsibility of the CIO and CTO (chief technology officer). This area of IT management involves managing the processes for information systems development and implementation, as well as the responsibility for research into the strategic business uses of new information technologies.

 Managing the IT organisation and the IT infrastructure

The CIO and IT managers share responsibility for managing the work of IT professionals who are typically organised into a variety of project teams and other organisational sub-units. In addition, they are responsible for managing the IT infrastructure of hardware, software, databases, telecommunications networks, and other IT resources, which must be acquired, operated, monitored, and maintained.