
MANAGEMENT INFORMATION SYSTEMS

REVISION KIT

Acknowledgment

Acknowledgment

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Part I: Introduction

This revision kit addresses needs of students preparing to sit CPA examination for
IFORMATION COMMUNICATION TECHNOLOGY

The kit is divided into THREE main parts:

Part I: INTRODUCTION

- Approach to Examinations
- Syllabus
- Topical guide to CPA past paper questions

Part II: REVISION QUESTIONS AND ANSWERS

Past paper questions with model answers (**Past papers June 2008- December 2013**)

Part III: Comprehensive MOCK examination papers with sample answers
To make effective use of this kit, candidates are advised to:

- Read widely some of the books suggested in the reading list so as to have adequate background information relating to the issues raised in the revision questions.
- Do the MOCK papers in part III under exam conditions and then check the solutions provided to assess their success in tackling the questions.

Given adequate and focussed preparation, this kit should be useful in enabling any student preparing for examinations in IFORMATION COMMUNICATION TECHNOLOGY and related courses of Information Systems to pass with good grades in the exams.

Approach to Examinations

The following are important points to note as you sit your exam:

- Read carefully and follow instructions given on the examination paper. Note that you are expected to answer any **five** of the eight questions for the examination. It is important that you clearly state the number of the questions attempted
- Assess the weight given to each question by looking at the marks and devote adequate time to answering precisely and conclusively all questions attempted. You should pace yourself to complete the examination in the time allowed. Do not be tempted to spend too long on your first one or two questions because you will be forced to rush the remaining questions and the quality of answers will inevitably be poor.
- Try to fully understand the question before attempting to answer, so as to address the specific points being asked and also to avoid missing out some parts of a question.
- Avoid long answers that do not address the questions asked, as these will not gain you extra marks. Clear layout of answers would benefit you. Use of paragraphs and headings rather than just writing a solid block of text for your answer is recommended. For questions that require narrative answers, **margin to margin text is difficult to read**. This format should not be used as it makes reading difficult and sometimes answer points can be missed with consequent loss of marks. The use of space in the form of clear gaps between question parts, the use of some form of numbering or bullet points to clearly indicate the point being made, make understanding so much easier for the examiner.
- Remember to always be relevant to the expectations of the questions. Avoid setting and answering your own question (s). Thus you will be expected to read thoroughly and understand questions before attempting to answer.
- Check questions divided into parts. These require that you address the parts adequately to earn maximum marks. It is equally important to assess the marks allocated to questions to see the extent of your answers.
- Give appropriate and relevant examples when required.
- The paper involves some practical aspects as you may be required to, for example, draw a data flow diagram (DFD), Entity Relationship models, and flow chart diagram or write some code for a program that you are developing. This therefore requires that you prepare adequately by knowing the standards involved and the expectations of the examiner in the practical questions. (Revision questions provide some typical answers).
- Always maintain confidence in approach to the examination. This way, you will be able to tackle questions adequately and you will be guaranteed to do well.

Common terms in examinations

1. **State/ List:** These terms imply that the candidate simply enumerates the expected points without any explanation.
2. **Define:** This implies explanation to a term with the aim of bringing out pertinent meaning. The meaning should be clearly brought out in the explanation and if there are any related terms they should also be differentiated where necessary.
3. **Outline:** Involves listing points and giving a brief explanation, sometimes a single line statement.
4. **Discuss:** This implies a thorough review of the identified case (question) with a view of bringing out clear meaning, merits and demerits as well as views of the candidate on the matter. If there are any comparisons or differences between the matters under discussion, they should also be brought out clearly.

Syllabus

KASNEB**IFORMATION COMMUNICATION TECHNOLOGY**

OBJECTIVE

To equip the candidate with an understanding of the nature of systems, their design and application in modern organisations with specific emphasis on information technology.

7.0 SPECIFIC OBJECTIVES

A candidate who passes this subject should be able to:

- describe computer systems
- differentiate between various types of computers and their use in data processing and information
- show a clear understanding of the nature of computer systems, their design and application
- apply systems approach in the management of an organisation.

CONTENT**7.1 Introduction**

- Functional parts of a digital computer
- Data representation in computers
- Classification and characteristics of computers
- Areas of computer application
- Aims, stages and methods of data processing
- Data processing versus Information processing
- Hardware and software: definition, description and application and types of software

7.2 Systems Theory and Organisations

- Systems concepts
- Classification of systems
- Components of systems
- Objectives and application of systems approach -Systems theory concepts
- Introduction to various organisational theories: classical and behavioural approaches, contingency approach to organisation
- Organisational components
- Functions of an organisation: technical, supervisory and management
- The organisation and its environments

7.3 System Analysis and Design

- Prototyping and rapid application development methods -Objectives of systems analysis and design
- The system development life cycle
- Systems analysis and design methodology and techniques -Analysis techniques: fact-finding techniques, fact-recording techniques, systems requirements reports
- Design techniques: input design, output design, file design, systems design, control and security aspects of system design, systems specifications reports.

- Systems development and implementation: selection and acquisition of computer hardware and software, program development phases, system implementation methodologies, updating of system documentation, system support
- System evaluation and maintenance: types of evaluation, types of maintenance

7.4 Information Systems

- Management structure and use of information
- Components of an information system .
- Business activities, people, data, networks and technology
- Functions of an information system; transaction processing, management reporting and decision support
- Types of information systems: characteristics and differences
- The organisation of an information technology department: the structure of an information technology department, duties of personnel in an information technology department, computer bureaux, evaluating effectiveness and efficiency of information technology departments

7.5 Application of Information Technology

- Applications of information systems in business, accounting, r i marketing, manufacturing, transportation, banking and human resources
- Application software for business

7.6 Computer Security Issues

- Definition of computer security -threats, hazards and counter measures
 - System security
- Physical security
- Data security
- Personnel issues
- Network security
- Types of computer crimes
- Legal aspects
- Audit requirements: the role of internal and external auditors
- Computer ethics
- Social implications

7.7 Data Communication and Computer Networks

- Principles of data communication
- Data transmission: analog versus digital, hardware and software considerations
- Computer networks: types of computer networks, network protocols
- Application of computer networks within an organisation: E-mail, Internet and Intranets
- Information Superhighway

7.8 Current Trends in Information Technology

- Electronic commerce
 - Software houses
 - Information resource centres
- Access of information technology by small-scale enterprises - Information technology and the law.

Questions – past paper
1

Part II: Past Paper Questions and Answers

QUESTIONS - PAST PAPERS**KENYA ACCOUNTS AND SECRETARIES NATIONAL EXAMINATION****BOARD ATC****IFORMATION COMMUNICATION TECHNOLOGY****July 2008.****Time Allowed: 3 hours.****Answer any FIVE questions. ALL questions carry equal marks.****QUESTION ONE**

New information systems quite often play a major role in the support of planning objectives of an organisation. Management participation is required for better evaluation and control of new systems.

Required:

Identify and explain three forms of competitive strategies which information technology would address. (9 marks)

- (b) Name three tangible and intangible benefits associated with new information systems. (6 marks)
- (c) List five ethical and societal dimensions to the development and use of information technology. (5 marks)

(Total: 20 marks)**QUESTION TWO**

Tactical management level may require the use of Decision Support Systems (DSS) for semi-structured decisions and data modelling.

Required:

- (a) Describe four functional characteristics of Decision Support Systems (DSS). (8 marks)
- (b) Name four types of accounting information systems which DSS may address. (4 marks)
- (c) Explain the term "prototype" and describe the main steps involved in its development. (8 marks)

(Total: 20 marks)**QUESTION THREE**

The rapid technological revolutions in both computer and management systems have brought in new dimensions in business process engineering and re-engineering.

Required:

- (a) Explain the two terms "process engineering and re-engineering". (5 marks)
- (b) Explain the use and application of the following:
 - (i) Telecommuting. (5 marks)
 - (ii) Electric data interchange. (5 marks)
 - (iii) Computer conferencing. (5 marks)

(Total: 20 marks)**QUESTION FOUR**

The recent desire for closer user participation in new systems development and distribution systems in operations have created more impetus for end user computing technologies.

Required:

- a) Define the term "end user computing". (2 marks)
- b) Identity six risks associated with end user computing. (6 marks)
- c) Explain the role of the following in promoting end user computing
 - (i) Information resource centres. (6 marks)
 - (ii) Object oriented programming. (6 marks)

(Total: 20 marks)**QUESTION FIVE**

The process of developing new programs involves a series of stages which are collectively referred to as program development life cycle.

Required:

- (a) In a sequential narrative, name and describe the main stages in the program development life cycle. (10 marks)
- (b) Explain how the use of Computer Aided Software Engineering (CASE) improves programming productivity. (4 marks)
- (c) Structured walkthrough addresses some areas of interest in a new program under programming productivity (6 marks)

(Total: 20 marks)**QUESTION SIX**

Project management is usually an important activity during the development of news information systems. Project resources such as time, cost and personnel would be identified and their uses properly controlled.

Required:

- (a) Explain the term 'critical path as used in project management. (4 marks)
- (b) Describe the role of project management. (6 marks)
- (c) Develop a network diagram and determine the critical path from the following project development schedule. (10 marks)

(Total: 20 marks)

Preceding Activity	Activity	Duration
A	-	2
B	-	3
C	-	2
D	C	4
E	A	3
F	B	4
G	B	6
H	B	4
I	D and H	6
J	E and F	5

QUESTION SEVEN

(a) During the design stage of a new information system, the following issues are addressed:

- User interface.
- Data.
- Process.

Required:

Discuss the composition of design document under the above three elements.

(12 marks)

(b) Briefly describe any four computer related crimes that an organisation which is considering computerising its operations should be aware of.

(8 marks)

(Total: 20 marks)

QUESTION EIGHT

(a) Explain meaning of the term Electronic Commerce (E-Commerce).

(2 marks)

(b) The following are some of the elements which constitute an E-Commerce application: - Automated Teller Machine (ATM) Electronic Data Interchange (EDI). Internet.

Required:

Illustrate the contributions of each of the above technologies in E-Commerce application. (6 marks)

(c) Explain the meaning of the following terms:

- I. Website. (4 marks)
- II. Cyber-cafe. (4 marks)
- III. Network browser. (4 marks)

(Total: 20 marks)

December 2008

Time Allowed: 3 hours

Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

a) Organisation information systems are categorised under:

- i) Transaction Processing System (TPS)
- ii) INFORMATION COMMUNICATION TECHNOLOGY (MIS)
- iii) Decision Support System (DSS)
- iv) Executive Information System (EIS)
- v) Expert Systems (ES)

Required:

Suggest one application of each of the systems types listed above for each of the following functional areas of business:

- Sales and marketing. (5 marks)
 - Finance (5 marks)
- b) What impact might end-user computing have on the organisation of information technology functions? (6 marks)
- c) Suggest examples of activities end-users might not be responsible for. (4 marks)
- (Total: 20 marks)**

QUESTION TWO

Photocopying is based on the simple idea that people can express more easily what they like or do not like about an actual working system.

Required:

- (a) (i) Examine four guidelines required for the development of a prototype. (8 marks)
- (ii) Select two facilities usually found in fourth generation languages (4GLs) and explain their application in developing a prototype system. (4 marks)
- (b) Explain how the use of Information Technology (IT) can bring about improvements in productivity within a business organisation. (8 Marks)

(Total: 20 marks)

QUESTION THREE

Access control is the restriction of unauthorised access to a portion of a computer system or the entire system.

Required:

- a) Explain the following control techniques and their significance in the context of data security.
- i) Biometric control (4 marks)
 - ii) Encryption (4 marks)
 - iii) Logical access (3 marks)

Application controls can be classified into three major categories, processing controls and output controls.

- b) Describe the objective of each control and examine the techniques within each to ensure maintenance of maximum feasible levels of control. (9 marks)

(Total: 20 marks)

QUESTION FOUR

- a) —Most systems are obsolescent the day they become operationalll. Comment on this statement giving six key reasons why changes to a system are so often necessary after it has been implemented. (8 marks)

- b) Give and explain two reasons, in each circumstance why the boot-up programs are stored.

i) In ROM

ii) On Disk

(8 marks)

- c) Describe the functional characteristics and applicability of the backing store. (4 marks)

(Total: 20 marks)

QUESTION FIVE

A company is to produce a suite of programs to provide a payroll analysis system. The raw data for the program input is as follows:

- Pay rate
- Hours worked

The logics of how to compute tax and NHIF are shown below.

Tax computation

Amount of pay £	Rate of Taxation
0 - 1000	No tax
1001 - 2000	1% of gross pay
2001 - 3000	2% of gross pay
Above - 3000	4% of gross pay

NHIF Computation

Amount in £	Rate
0- 2500	2.4% of gross pay
2501 and above	3% of gross pay

Required:

- a) Draw a detailed program flow chart that will perform the following tasks:

- Accept the above raw data.
- Compute and display Gross pay, Tax, NHIF and Net pay.

(16 marks)

- b) What is the purpose of programming standards?

(4 marks)

(Total: 20 marks)

QUESTION SIX

Electronic Commerce (e-commerce) is an emerging concept that describes the buying and selling of products, services and information via the computer networks including the internet.

Required:

- a) Brief explanation of the following concepts as relates to e-commerce:
 - i) Electronic market. (2 marks)
 - ii) Electronic purse. (2 marks)
 - iii) Cyber banking. (2 marks)
 - iv) Cyber mall. (2 marks)
- b) Examine the benefits of e-commerce to consumers. (12 marks)

(Total: 20 marks)

QUESTION SEVEN

- a) Business process re-engineering (BPR) is the fundamental rethinking and radical redesign of business process to achieve a dramatic improvement in measures of performance such as quality, cost, speed and services.

Required:

- i) List the steps of BPR. (4 marks)
- ii) Critically examine the role information technology (IT) plays in BPR (8 marks)
- b) The general manager of a large organisation has asked you to draw up a document identifying eight important system characteristics against which managers can evaluate the success of an information system together with a brief explanation of each. What would your document contain? (8 marks)

(Total: 20 marks)

QUESTION EIGHT

INFORMATION COMMUNICATION TECHNOLOGY should facilitate decision-making at all levels of management. Each level requires information with different characteristics and with differing degree of profitability.

Required:

- a) Examine the characteristics of information used in (i) strategic planning and (ii) operational control. (11 marks)
- b) Discuss the features of deterministic, stochastic and adaptive systems. Give a practical example of each type of system. (9 marks)

(Total: 20 marks)

June 2009

Time Allowed: 3 hours

Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- (a) Client/Server architecture, database technology and networks provide structures which facilitate sharing of corporate data and information.

As an information Technology (IT) specialist, outline the major precautions that should be taken into account in the process of sharing data. (6 marks)

- (b) Describe the relevance of the following to a Decision Support System (DSS):
- (i) Specialised packages: (2 marks)
 - (ii) Query languages; (2 marks)
 - (iii) Database management system (2 marks)
- (c) List four application packages that you might consider using on a micro-computer for administrative functions in an organisation. Explain how each of these packages can increase an organisation's efficiency. (8 marks)

(Total: 20 marks)**QUESTION TWO**

- a) Systems walkthroughs are procedures that are commonly used as a means of quality assurance in the information systems development process.

Required:

- i) Describe the composition and the roles of walk through teams. (8 marks)
 - ii) Provide a checklist of items to be examined during the walkthrough. (4 marks)
- b) Explain what is meant by a Graphical User Interface (GUI) and account for the increased design and implementation of such interfaces. (8 marks)

(Total: 20 marks)**QUESTION THREE**

Write short descriptive notes on the following:

- a) Electronic Data Interchange (5 marks)
- b) Client/server computing (5 marks)
- c) System specification (5 marks)
- d) Electronic point of sale system (5 marks)

(Total: 20 marks)**QUESTION FOUR**

- a) Name six guidelines required for the development of new information systems. (6 marks)
- b) Explain the meaning of the following terms, bringing out clearly the distinction between the terms in each pair.
- i) Unit testing and systems testing. (2 marks)
 - ii) Preventive and perfective maintenance (2 marks)
 - iii) Co-processing and parallel processing. (2 marks)
 - iv) Logical and physical design of a system. (2 marks)

- c) Explain the contribution that an information resource centre might make towards end-user computing. (6 marks)

(Total: 20 marks)

QUESTION FIVE

- a) The widespread use of computers in offices have raised major health and safety issues. Describe three major health related problems that may result from intensive computer use and list three products that may be made available to improve the working conditions of personnel using computers. (9 marks)
- b) Describe any three basic strategies that an organisation can employ to obtain competitive advantage and illustrate the role of Information Technology in each case. (9 marks)
- c) Distinguish between online and offline transactions. (2 marks)

(Total: 20 marks)

QUESTION SIX

Without proper consideration of the behaviour of people in the business organisation setting even the best technically designed system is likely to fail.

Required:

- a) Analyse the most common reasons that may lead to resistance to the introduction of INFORMATION COMMUNICATION TECHNOLOGY and how an organisation can overcome it. (12 marks)
- b) —Change is inevitable. Change occurs in many ways and adapting to change is a primary management responsibility. Identify the factors, which bring about change in an organisation. (8 marks)

(Total: 20 marks)

QUESTION SEVEN

The continuing development and improvement of information technology has revolutionised the accountancy functions in most organisations.

- a) Discuss the benefits and dangers of the increasing use of information technologies to the accounting functions in an organisation. (16 marks)
- b) Identify the major factors that influence the structure of an information system. (4 marks)

(Total: 20 marks)

QUESTION EIGHT

- a) What factors should guide a systems designer when designing the user interface for a particular application? (10 marks)
- b) Currently there has been a general trend to consolidate previously separate data centres into larger centres or the move from classic decentralisation as a proliferation of mini data processing departments into centralised information system providers.

Required:

Explain the factors influencing re-centralisation of information systems. (10 marks)

(Total: 20 marks)

December 2009

Time Allowed: 3 hours

Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- a) A computer user might buy hardware and software direct from the vendors. Given that the expense is often considerable, the purchasing procedure must be carefully controlled.

Required:

In a sequential narrative, name and describe the procedure of acquiring hardware and software. (8 marks)

- b) There are four major change-over strategies that may be adopted during the implementation phase of information systems development process.

Required:

Recommend and justify the changeover strategies to be adopted for the following systems:

- i) Electronic point of sale systems for chains of supermarkets countrywide. (2 marks)
 - ii) Secondary school admission system. (2 marks)
 - iii) Airline seat reservation system. (2 marks)
- c) Describe any three features of information needed for strategic planning in an organisation. (6 marks)

(Total: 20 marks)**QUESTION TWO**

- a) —Everything an expert system can do, a decision support system (DSS) can also do. Discuss any four grounds that consistently support or disapprove this statement. (8 marks)
- b) Whenever a user buys a software, it is essential that the software comes with a seller maintenance contract. As an outside consultant, you are required to explain to the user what a seller maintenance contract is and the specifications required by the user in a seller maintenance contract. (8 marks)
- c) In the context of programming, differentiate between source code and object code. (4 marks)

(Total: 20 marks)**QUESTION THREE**

- a) Identify and describe the main criteria which should be met by a local area network design. (6 marks)
- b) What reasons would you put forward for adopting a database as a basis for an information system? (6 marks)
- c) It has been cited that Information Technology has caused —more harm than good. One of the vices cited is computer related crime. Outline and briefly describe four categories of computer related crimes. (8 marks)

(Total: 20 marks)

QUESTION FOUR

- a) Decisions can either be classified as structured (programmed) or unstructured (non-programmed).

Required:

- i) Distinguish between programmed and non-programmed decisions. (4 marks)
 - ii) Identify each of the following with the type of decision to which it may apply.
 - Computer program; (1 mark)
 - Stock ordering; (1 mark)
 - Judgement; (1 mark)
 - Regulation. (1 mark)
- b) You recently attended a seminar organised by the Institute of Certified Public Accountants of Kenya (ICPAK) on information management into the 21st century. One of the topics covered was on Internet and its impact on the society. Your first task is to explain to the senior management the effect of Internet on the following sectors of society.
- i) Education. (6 marks)
 - ii) Service provision industry. (6 marks)

(Total: 20 marks)

QUESTION FIVE

- a) For applications such as banking, it may be argued that security is a major concern when implementing database systems. As a database administrator, you are expected to explain five security features expected to be included with the design of the database systems. (10 marks)
- b) What is meant by cost/benefit analysis? Illustrate its relevance to the System Analyst during systems development life cycle. (6 marks)
- c) Examine four any four desirable features which should be inherent in an operating system. (4 marks)

(Total: 20 marks)

QUESTION SIX

- a) Due to complexity of information systems development, a number of tools and methodologies have been used to resolve this complexity. Some of such tools and methodologies include Computer Aided Software Engineering (CASE) and Prototyping.

Required:

Identify those aspects of information systems development life cycle for which these tools or techniques are available illustrating their application in each case. (12 marks)

- b) Examine the role of a database administrator in an organisation. (8 marks)

(Total: 20 marks)

QUESTION SEVEN

- a) The trends towards distributed data processing and end user development can have significant effect on the structure and operation of Information Technology in an organisation. Although the underlying trends and advantages are favourable, managers have to aware of potential problems.

What problems would you envisage arising as a result of widespread end-user computing and how might such problems be avoided? (8 marks)

- b) Your company has decided to replace its existing accounting system. The company has identified the requirements of the system. The company wishes to make a decision on how to acquire this application-software.

Required:

Identify the three main sources of applications-software and discuss the appropriateness of each source. (6 marks)

- c) Identify and describe the application of fourth generation languages (4GLs) during information system development. (6 marks)

(Total: 20 marks)

QUESTION EIGHT

- a) Give four examples of industries and business organisations that are currently using computer networking. (4 marks)
- b) What are the implications of increased electronic networking on computer security? (4 marks)
- c) What is active participation of senior management in design of information systems important? (8 marks)
- d) Using a practical example, explain what is meant by sub-optimisation. (4 marks)

(Total: 20 marks)

INFORMATION COMMUNICATION TECHNOLOGY**May 2010.****Time Allowed: 3 hours.****Answer any FIVE questions. ALL questions carry equal marks.****QUESTION ONE**

- (a) Most users interact with their computer systems through a command-driven interface or graphical interface. As a person in charge of Information Technology (IT), your boss is proposing that you move away from the command driven interface you are currently using, to a new platform which is object-based and has appealing interface as well as being more user friendly.

What advise might you offer your boss regarding this proposal (8 marks)

- (b) A software engineer requires a range of software utilities. Explain the usefulness of any three such utilities. (6 marks)
- (c) Name six areas covered under post-audit activity. (6 marks)

(Total: 20 marks)**QUESTION TWO**

- (a) Many products now have a bar code attached to them. When a transaction takes place, the bar code is scanned and information is recorded. However, this method is not suitable for all data collection, for example the bar code method is unsuitable for automated examination entry.

Required:

Briefly describe the key features of a product, event or transaction that make it suitable for bar coding. (5 marks)

- (b) The ordinary password scheme for access control is theoretically a strong security mechanism. In practice, it can be extremely vulnerable. Explain the steps that may be taken by the systems administrator to ensure security of password based access control mechanism. (6 marks)
- (c) List any five activities which are performed during systems delivery process. (5 marks)
- (d) Explain the meaning of the following terms:
- (i) Downsizing. (2 marks)
 - (ii) Cyber-cafe. (2 marks)

(Total: 20 marks)**QUESTION THREE**

- (a) You are a consultant specializing in systems development brought in by an organization to advise on systems development plan. If prototyping approach and Computer Aided Software Engineering (CASE) tools were adopted to complete the new system, how would it affect your development plan? (4 marks)
- (b) A certain programmer once said that "once we write the program and get it to work, our job is done".
- Comment on this statement giving four reasons that consistently support or disapprove this statement (6 marks)
- (c) Examine any four weaknesses of a conventional file approach which database systems are meant to address. (4 marks)

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- (d) (i) What is multiprogramming as applied to a computer system? (3 marks)
(ii) Explain two major advantages of multiprogramming. (3 marks)
(Total: 20 marks)

QUESTION FOUR

- (a) Although computer systems should be designed to ensure accurate data processing, an auditor is likely to make use of one or more computer-based techniques in order to check that accuracy. Describe any three techniques available to the auditor and the situations where each might be used (9marks)
(b) Why are tools such as data flow diagrams (DFD), entity relationship diagrams (ERD) and flowcharts particularly suited for documenting design options of an information system compared to narrative texts'? (6 marks)
(c) List five questions which need to be addressed when evaluating the strategic value of Information Technology. (5 marks)
(Total: 20 marks)

QUESTION FIVE

- (a) You have been appointed to be in charge of an information systems development project. As a project leader, explain how you would ensure that the project succeeds. (8 marks)
(b) Giving reasons, identify four situations where communication over wireless medium for instance radio and mobilephones may be preferable to guided communication (over cable). (8 marks)
(c) Select two facilities usually found in fourth generation languages (4GLs) and explain their application in developing a prototype. (4 marks)
(Total: 20 marks)

QUESTION SIX

- (a) Discuss any four types of feasibility assessment that you need to perform to enable you recommend the undertaking of a given project. (4 marks)
(b) Discuss how virtual memory concept is implemented indicating its key objective. (6 marks)
(c) Do you consider it justifiable to argue that computers actually result in job losses'? Support your answer with well articulated facts. (10 marks)
(Total: 20 marks)

QUESTION SEVEN

- (a) Give one reason to support the importance of controlling data inputs and discuss any four methods that you may use to control data inputs. (6 marks)
(b) User training and support is fundamental to the success of an information systems project. Produce a briefing document that discusses the usefulness of training. (6 marks)
(d) Examine the contribution of information systems in decision-making or problem solving process. (4 marks)
(d) What is the link between database technology and client/server computer systems? (4 marks)
(Total: 20 marks)

QUESTION EIGHT

- The electronic business (e-business) field is growing and changing rapidly resulting in the need to address certain infrastructural issues to support it.

Required:

Suggest the possible contribution of the following systems in e-business applications:

- (i) Smart Cards. (2 marks)
 - (ii) Electronic Data Interchange (EDI) systems (2 marks)
 - (iii) World Wide Web (WWW). (4 marks)
 - (iv) Automatic Teller Machines (ATMs). (2 marks)
- (b) Suggest possible uses for an expert system within the Customer Database Department. (6 marks)
- (c) Object Oriented Programming (OOP) concept is becoming the most common terminology in programming environment.

Discuss the advantages for a company moving towards an object oriented programming approach (4 marks)

(Total: 20 marks)

INFORMATION COMMUNICATION TECHNOLOGY

December 2010.

Time Allowed: 3 hours.

Answer any FIVE questions. ALL questions carry equal marks.

QUESTION ONE

- (a) There are three main types of network topologies namely; star, ring and bus. As a network administrator, you have been asked to produce a briefing document that discusses each topology in terms of cabling cost, fault tolerance, data redundancy and performance as the number of nodes increases. (12 marks)
- (b) Information security management is about viewing and managing risks in terms of the causes, effects and therefore costs of loss of security.

Required:

Identify and briefly describe the stages involved in systematic management of information systems (8 marks)

(Total: 20 marks)**QUESTION TWO**

- (a) What contribution does prototyping make in resolving the complexity of information systems development? (8 marks)
- (b) Conceptual design sometimes called feasibility design involves showing the feasibility of meeting the management objectives for MIS.

Explain the tasks involved in conceptual design. (9 marks)

- (c) What are some of the challenges faced in systems maintenance? (3 marks)

(Total: 20 marks)**QUESTION THREE**

- (a) One of the reasons for adopting a database as a basis for an information system is to enhance data/program independence.

Required:

- (i) Explain the importance of data/program independence. (4 marks)
- (ii) Recommend suitable security features that need to be instituted in a database environment where many transactions take place concurrently such as a bank. (6 marks)

Examine the factors which may complicate the audit of computerised systems (6 marks)

- (c) What implementation problems are likely to occur if proper documentation was not produced during program design? (4 marks)

(Total: 20 marks)

QUESTION FOUR

- (a) It is envisaged that the World Wide Web (WWW) will enable institutions to take services closer to the people.

Required:

- (i) As a close advisor of ABC Tutorial College you are required to explain how WWW can make this a reality. (6 marks)
 - (ii) Suggest any two managerial issues that are critical for its successful implementation (4 marks)
- (b) The organisation for which you work is contemplating designing a batch processing system to manage their payroll applications and a real-time system to manage their inventory applications.

Required:

Giving reasons recommend a suitable file design for each of the two systems.

(6 marks)

- (c) Explain the following systems concepts:

- (i) Differentiation. (2 marks)
- (ii) Entropy. (2 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) State any four components of an information system that you would propose for an accounting system of an organization (4 marks)
- (b) Explain the application of Internet in the following areas:
- (i) Healthcare. (4 marks)
 - (ii) Banking. (4 marks)
- (c) Propose the type of information system you would recommend for the following applications:
- (i) Maintenance of general ledger (1mark)
 - (ii) Formulation of competitive market strategies (1 mark)
 - (iii) Financial sensitivity or risk analysis. (1mark)
 - (iv) Ticket reservations. (1mark)
- (d) Identify the major factors that influence the structure of an information system. (4 marks)

(Total: 20 marks)

QUESTION SIX

- (a) The company for which you work is currently facing financial crisis. The financial controller has proposed that the company should seek for alternative sources of software. One of the options available is that of freeware from the Internet and magazine vendors. As the organisation's information technology manager, advise on the implications of adopting this proposal. (6 marks)
- (b) Briefly explain the following programming objectives:
- (i) Utility. (2marks)
 - (ii) Reliability. (2marks)

-
- (i i i) Maintainability. (2 marks)
 - (iv) Efficiency. (2 marks)
 - (v) Security. (2 marks)
 - (c) List any four application packages you would recommend for administrative work in an office (4 marks)
- (Total: 20 marks)**

QUESTION SEVEN

- (a) Examine four reasons that may make an organisation outsource some of its non-core information technology activities or services. (8 marks)
 - (b) Why is it essential to make periodic reviews of information systems projects (6 marks)
 - (c) In conducting a cost-benefit analysis, state any three cost items and any three intangible benefits you would Consider (6 marks)
- (Total: 20 marks)**

QUESTION EIGHT

Your organisation is considering computerising its range of activities but due to shortage of systems development staff, only a few of the proposed systems can be approved for development.

- (a) Give four possible courses of action that may be taken to overcome the shortage of staff and thus allow full implementation of the system (8 marks)
 - (b) Suggest three types of decisions that electronic point of sale system can support indicating sales information required to support each decision. (6 marks)
 - (c) Outline three functionalities or tools that an automated software development tool requires. (6 marks)
- (Total 20: marks)**

INFORMATION COMMUNICATION TECHNOLOGY FRIDAY:**June 2011.****Time Allowed: 3 hours. Answer any FIVE questions.****ALL questions carry equal marks.****QUESTION ONE**

- (a) It is claimed that data required to support strategic planning differs from data required to support operational decisions in terms of the time period referred to and the source or origin of the data.

Required:

Briefly describe how data required to support strategic planning differs from that required to support operational decisions in terms of:

- (i) Time period referred to. (4 marks)
- (ii) The source or origin of the data. (4 marks)
- (b) The organisation you work for has hired a software engineer to develop a suite of software to manage your payroll application system. As the financial manager, you are working closely with the software engineer to ensure that the software quality assurance standards are attained.

Required:

- (i) List any four data validation checks that the software engineer should incorporate into the program. (4 marks)
- (ii) Why is it important to test the software before implementing it? (2 marks)
- (iii) Suggest two measures that the software engineer must take in order to simplify user training and support that is fundamental to the success of the information systems project. (6 marks)

(Total: 20 marks)**QUESTION TWO**

- (a) The accounting department of a medium sized business organisation for which you work wishes to purchase microcomputers to support its functions. You have been asked to draft a document that outlines the hardware and software specifications for the proposed project.
What would your draft contain? (8 marks)
- (b) User friendliness is one of the key and desirable features that form a basis for evaluating competing software packages.

Required:

- Name and describe three features of a user friendly software. (6 marks)
- (c) Why are expert information systems not popular in business systems? (4 marks)
- (d) Define the term "Business continuity planning". (2 marks)

(Total: 20 marks)**QUESTION THREE**

Four companies A., B, C and D, which have similar activities but are not part of a group, have the following computer configurations,

Company A: Three stand-alone micro-computers (CPU, VDU, Keyboard, hard disk and mouse) each having its own printer.

Company B Small office with 11 micro-computers linked in a Local Area Network (LAN). Each micro-computer has its own processing ability, but is linked via the LAN to central printers, disk storage, file server and tape streamer devices. The LAN is completely self-contained, This means that there are

no modems or other similar external devices attached to it.

Company C Four processing locations connected by a Wide Area Network (WAN). Each location has a LAN in the same configuration as company B, although there is also a dedicated landline to two of the three offices (offices are connected in a ring to two of the other offices). Each server is updated with data from the other three locations at 15 minutes interval.

Company D Twenty processing locations, each with its own LAN in the same configuration as company B. All locations are connected in a star configuration to head office. File servers at each location are updated from head office after every five minutes. Each location has a reserved external telephone line for selected customers to use. Orders by customers are transmitted direct on to the company D's Computer system

Required:

- (a) State, with reasons, for each company, what security procedures should be applied to ensure there is no unauthorised access to its computer system. (12 marks)
- (b) Company B is planning to establish additional branches and wants to upgrade its systems to duplicate those of company D. State and explain the data communication systems you would recommend (8 marks)
- (Total: 20 marks)**

QUESTION FOUR

- (a) A company needs information on which to base decisions concerning the current operations and future plans. Explain areas of management control where computers are used or can be used. (8 marks)
- (b) One important aspect of information-systems management is the physical and managerial location or siting of the information system within an organisation. Explain two information systems location options indicating circumstances under which each siting allocation is appropriate. (12 marks)
- (Total: 20 marks)**

QUESTION FIVE

- (a) During systems development life cycle (SDLC): the systems analyst uses some tools to model the users requirements in such a way that he is able to communicate his understanding of the users needs.

Required:

Identify and describe three tools the systems analyst may use to model the systems requirements. (6 marks)

- (b) (i) Graphical user interface (GUI) have proved to be more user friendly than current character based systems. Other than the graphical user interface, give a summary of at least three interfaces you would use in the design of systems. (3 marks)
- (ii) Briefly explain three ways in which GUI makes a system user friendly. (6 marks)
- (c) Using your own experience, explain why more and more software is being purchased for windows environment as opposed to character based environment. (5 marks)
- (Total: 20 marks)**

QUESTION SIX

- (a) The adoption of database systems as a way of managing information systems is gaining popularity over standard file

Required:

- (i) State the features of a database management system that provide data security and integrity. (4 marks)

- (ii) What problems are caused by data redundancies? (4 marks)
- (iii) Centralized control avoids unnecessary data redundancy or duplication. What precautions should be taken into account -in the process of establishing a centralized data control system to avoid data redundancy? (6 marks)

(b) It is important to bear in mind that information may be relevant to people outside the organisation as well as to its internal management and employees. Sometimes it happens that some decisions relating to an organisation are taken by outsiders.

State six examples of decisions relating to an organisation that may be taken by outsiders (6 marks)

(Total: 20 marks)

QUESTION SEVEN

- (a) Risks to data are relevant to manual as well as computerised systems. With computerized systems however, the risks are greater, because data are held on magnetic files and cannot be seen or read by the human eye. What risks are particularly relevant to data storage on a magnetic medium? (5 marks)

- (b) Your managing director is in two minds about establishing a company website and has asked you to produce a "balanced report" on the pros and cons. You have already written several pages on the benefits and you have just started on a section headed "Anxieties".

What sub-headings might this section include? (5 marks)

- (c) Why do organisations automate reasoning or decision making tasks which human beings are naturally better able to perform than computers? (4 marks)
- (d) State six ways in which a business can use Desktop Publishing (DTP). (6 marks)

(Total: 20 marks)

QUESTION EIGHT

- (a) Decision support systems (DSS) help to fulfil management's requirements for computerized information systems by assisting them in complex and unstructured tasks.

Required:

Describe the relevance and uses of a DSS to management accountants. (8 marks)

- (b) Name and explain three tasks that the systems analyst would undertake in the design phase of information systems development process. (6 marks)
- (c) Explain why Local Area Networks (LANs) have been successful in improving the flow of data and information in organisations. (6 marks)

(Total: 20 marks)

INFORMATION COMMUNICATION TECHNOLOGY

December 2011.

Time Allowed: 3 hours.

Answer any FIVE questions. ALL questions carry equal marks.

QUESTION ONE.

- (a) You are a manager in one of the leading accounting Firms in the country. You have been registered as a network user on the company's local area network (LAN) which enable you to send memos by electronic mail. You are however concerned about the security of the LAN.

Required:

- (i) Explain four administrative controls that should be implemented to guarantee the network security. (4 marks)
- (ii) Describe two methods or techniques used to secure the electronic mail messages being transmitted through the network. (2 marks)
- (iii) Explain three policy issues that should be put in place to reduce virus-rom attacking your network. (3 marks)

- (b) On coming back from a fact finding mission about a company in need of automating its sales department, your supervisor hands over a report to you for analysis. Since you are on internship in the Firm, you are only required to comment your ideas for consideration before they can be approved for implementation.

Required:

- (i) Explain what is meant by systems analysis. (2 marks)
- (ii) Outline four main objectives of systems analysis. (4 marks)
- (iii) State some of the personnel who work in the information systems and their tasks in the analysis phase. (5 marks)

(Total: 20 marks)

QUESTION TWO

- (a) The adoption of database systems as a way of managing information systems is gaining popularity in most organisations. Some industries such as the banking industry are replicating the databases at various sites. that is. distributing the databases to the sites.

Required:

- (i) Name and explain four possible benefits and challenges of replicating or distributing databases to various sites. (8 marks)
- (ii) State and explain three factors that can influence an organisation's decision to distribute or not to distribute databases. (6 marks)
- (b) State two methods of enforcing security in each of the following areas:
 - (i) Hardware. (2 marks)
 - (ii) Database management systems. (2 marks)
 - (iii) Operating system. (2 marks)

(Total: 20 marks)

QUESTION THREE

- (a) Computer hardware and software are usually supplied separately. However, the process of evaluation and acquisition should be related to each other as the functioning of each depends on the other.

Required:

- (i) Why is the evaluation of computer hardware and software vendors absolutely necessary? (2 marks)
- (ii) When acquiring an in-house computer system, which criteria are considered in deciding between the various vendors, manufacturers or suppliers who have submitted tenders? (4 marks)
- (b) Discuss three different ways in which managers can take advantage of downsizing in computer technology. (6 marks)
- (c) Most organisations are now using fourth generation languages (4GLs) for application development.
Explain three benefits of using 4GLs. (6 marks)
- (d) State any two features of a Visual Display Unit. (2 marks)

(Total: 20 marks)**QUESTION FOUR**

- (a) List and discuss two issues that are likely to cause system failure in each of the following stages of a system development life cycle:
 - (i) Testing. (3 marks)
 - (ii) Project definition. (3 marks)
 - (iii) Design. (3 marks)
 - (iv) Requirement analysis. (3 marks)
- (b) A clear statement of information needs is fundamental for good system design.
Explain the factors that may contribute or influence management information needs. (8 marks)

(Total: 20 marks)**QUESTION FIVE**

- (a) Information technology and business environments are rapidly changing such that systems must also keep on evolving in order to keep pace with changes in the environment.
In an attempt to upgrade an organisation's system, state the individual members of staff and their corresponding tasks who would be involved with the change. (8 marks)
- (b) Outline the main reasons why information technology is viewed as a strategic resource in business organisations. (8 marks)
- (c) List four problems encountered when using standard files for data processing systems. (4 marks)

(Total: 20 marks)**QUESTION SIX**

- (a) Computer aided software engineering (CASE) is a tool for programmers, systems analysts, business analysts and systems developers used to help automate software development and at the same time improve software quality.

Required:

Under what circumstances would the use of CASE tools be considered a viable option by the systems developers? (8 marks)

- (b) What impact may end-user computing have on the organisation of information

technology (IT) functions? (6 marks)

(c) Explain the meaning and the use(s) of the following types of storage:

(i) Writable/recoverable CDs. (3 marks)

(ii) DVDs. (3 marks)

(Total: 20 marks)

QUESTION SEVEN

(a) The electronic business (e-business) field is an emerging concept that seems to be revolutionizing the business world yet many companies have failed to exploit the opportunities of e-business with their customers and suppliers.

Required:

(i) Name and explain four opportunities e-business may offer to both companies and their customers (8 marks)

(ii) Examine two challenges that may hinder a company's attempt to implement the e-business concept. (4 marks)

b) What are the four main applications of a database system in a customer department? (4 marks)

(c) Most information systems are reviewed or critically examined a few months after they have been implemented or put into operation. (4 marks)

Required:

State key reports resulting from this exercise outlining their structural content.

(4 marks)

(Total: 20 marks)

QUESTION EIGHT

(a) In most organisations, the accounting function ranks among the first activities to be computerised. There are various reasons why some activities have to be computerised before others. These reasons range from staff shortage to initial cost outlay and maintenance costs.

Required:

(i) Name and explain any four unique properties of the accounting functions that make it necessary for computerisation. (8 marks)

(ii) List four accounting functions that can be automated or computerised. (4 marks)

b) What are the functions of a computerisation-project steering committee? (6 marks)

Name two areas of interest in a formal systems walk through process. (2 marks)

(Total: 20 marks)

INFORMATION COMMUNICATION TECHNOLOGY FRIDAY:**JUNE 2012****Time Allowed: 3 hours.****Answer any FIVE questions. All questions carry equal marks****QUESTION ONE**

- a) Kenfin Ltd is a medium size commercial bank having branches in major towns in Kenya. The bank provides over the counter services and is planning to introduce online banking services. The online banking services will enable the bank to centralize some information processing systems while decentralizing others. You are the project manager overseeing the implementation of the online banking services project.
- (i.) What information systems services would you recommend to be centralized or decentralized? Justify your answer citing any assumptions made. (8 marks)
- (ii.) Describe three key risks that may affect the duration and/or cost of the project. (6 marks)
- b) Describe how a software developer can make use of the internet. (6 marks)
- (Total: 20 marks)**

QUESTION TWO

- a) Suggest the three types of decisions that a management accounting information system can support indicating the type of accounting information required to support each decision. (6 marks)
- b) It is claimed that fourth generation languages (4GLs) can reduce delays in applications development and make information freely and readily available. Comment on this statement discussing four grounds that consistently support or disapprove it. (8 marks)
- c) What does an organization's approach to system conversion depend on? (4 marks)
- d) In the context of computer programming, differentiate between source code and object code. (2 marks)
- (Total: 20 marks)**

QUESTION THREE

- a) In many computer installations, the most common form of terminal is the visual display unit (VDU). State and explain key features of a VDU terminal. (8 marks)
- b) Computerized accounting/financial systems still need internal controls to enhance the integrity of such systems. Explain four internal control procedures that need to be put in place to guarantee the integrity of such systems. (8 marks)
- c) Explain the following database security features:
- (i.) Authorization (2 marks)
- (ii.) Authentication (2 marks)
- (Total: 20 marks)**

QUESTION FOUR

- a) Describe the functional components of a typical computer system. (5 marks)
- b) Differentiate between the following terms:
- (i.) Hardware and software; (1 mark)
- (ii.) Application software and system software; (1 mark)
- (iii.) Bit and byte; (1 mark)

- (iv.) RAM and ROM; (1 mark)
- (v.) Data and information. (1 mark)
- c) Describe three major factors that affect the performance of a computer operation. For each factor, state one example of measurement. (6 marks)
- d) Examine the issues to be considered when planning for information systems training. (4 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) Who should be involved in a requirement review? Suggest their role in the requirement review. (8 marks)
- (b)
 - (i) Networks are increasingly being managed remotely. Name three security implications of remote network management and three mechanisms that are needed for remote network management. (6 marks)
 - (ii) Examine some of the challenges facing the convergence of networks in business organizations. (6 marks)

(Total: 20 marks)

QUESTION SIX

- a) Briefly describe the following two elements of software quality and explain how each element can be measured:
 - (i.) Functional correctness of the software. (4 marks)
 - (ii.) Reliability of the software. (4 marks)
- b) Give four examples of industries and business organizations that are currently using computer networking. (4 marks)
- c) Human intelligence can be defined as a person's ability to solve problems, utilize logic and think critically. Discuss the major differences between human intelligence and artificial intelligence. (6 marks)
- d) Examine two disadvantages of using direct access storage devices. (2 marks)

(Total: 20 marks)

QUESTION SEVEN

- a) Describe any three features of information needed for strategic planning. (6 marks)
- b) What risks do you see in using information communications technology (ICT) as a strategic resource and what actions should be taken to make ICT a viable strategic resource? (6 marks)
- c) Electronic point of sale (EPOS) and Automatic Teller Machines (ATMs) are the dominant terminals currently being used in business. Briefly explain three summary reports that are likely to be generated by each terminal. (6 marks)
- d) Differentiate between logical file structure and physical file structure. (2 marks)

(Total: 20 marks)

QUESTION EIGHT

- a) In modern economies, the volume of trade transacted by enterprises over the internet is rapidly increasing that transacted through the traditional channels.

Discuss how any two traditional functions of doing business have moved to the internet and the benefits this movement has brought to enterprises. (10 marks)

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- b) Most governments are embracing information communication technology through the implementation of e-governance initiatives.

Describe what is meant by e-governance and give four areas in which e-governance is beneficial to the public.

KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS BOARD

ATC

IFORMATION COMMUNICATION TECHNOLOGY

December 2012.

Time Allowed: 3 hours.

Answer any FIVE questions.
marks.

ALL questions carry equal

QUESTION ONE

- (a) Certain employees will always be placed in positions of trust, for example senior systems analysts, database administrators and information systems security managers. Such employees can therefore, compromise the security of information systems if they so wish.

Required:

- (i) Explain three control measures that an organization should institute over these employees and guarantee the security of the information systems. (6 marks) (ii) Every individual in an organization has some opportunity to commit computer fraud. The potential for which they can do so depends on a number of factors. Examine three of these factors. (6 marks)
- (b) Ethical principals can help in evaluating the potential harms or risks in the use of information communication technology.

Required:

Explain ant two principles of technology ethics. (4 marks)

- (c) Explain the advantages to an organization in having users involved in developing an information systems application. (4 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Some of the major challenges facing the convergence of networks in businesses is performance, that is, the network can at times be painfully too slow and result in high interconnectivity costs.

Required:

- (i) Explain the meaning of the terms —bandwidthll and — interconnectivity costsll. (4 marks)
- (ii) Examine four factors that can determine the extent to which network performance degrades or slows down. (8 marks)

Explain two strategies that business organizations can adopt to keep network costs low. (4 marks)

- (b) Identify any four common reasons for losing data in computer-based systems. (4marks)

(Total 20 marks)

QUESTION THREE

- (a) Quality assurance and testing are important in developing and delivering information systems.

Required:

Briefly describe four characteristics of quality assurance you would expect to find in a software product. (8 marks)

- (b) It is always recommended that any new system should have a graphical user interface (GUI) to make it easier to use than current character-based systems.

Required:

Briefly describe what is meant by a graphical user interface (GUI). (2 marks)

Discuss two limitations associated with the implementation and use of GUI. (6 marks)

- (c) Identify four major factors that influence the structure of an information system. (4 marks)

(Total 20 marks)

QUESTION FOUR

- (a) Transaction processing systems capture and process data resulting from the occurrence of business transactions, to update organizational databases in order to produce a variety of information products.

Required:

Explain the five stages of a transaction processing cycle. (10 marks)

- (b) A data dictionary is a repository of information about data.

Explain the characteristics of a data dictionary. (4 marks)

- (c) The concept of an intelligent workstation is a combination of a personal computer and access to a local or wide area network. The hardware, software and communication are integrated into one facility.

Required:

Define and differentiate functional integration and physical integration in a workstation environment. (6 marks)

(Total 20 marks)

QUESTION FIVE

- (a) The company you work for intends to computerize its payroll application.

Explain the functional capabilities that the system should have for it to serve the intended purpose. (8 marks)

- (b) Outline four features of a word processing software package. (4 marks)

- (c) Explain the importance of documenting and agreeing on the information systems requirements. (6 marks)

- (d) Name the basic requirements for internet connectivity. (2 marks)

(Total 20 marks)

QUESTION SIX

- (a) Wanjeshi Sacco Ltd. is intending to introduce a corporate database to support a variety of its information needs.

List two organizational, technical and human factors to be considered in the process of establishing the corporate database environment. (6 marks)

Propose two database models that can act as design alternative options. (2 marks)

Explain four database areas in which the company would be justified in restricting employee access. (8 marks)

- (b) Explain four network management functions. (4 marks)

(Total 20 marks)

QUESTION SEVEN

- (a) Give four reasons that may make an organization abandon an information systems project. (8 marks)

- (b) List four problems that are faced when using standard files for data processing systems. (4 marks)

- (c) Name four modern computer -based information systems' structures that support the sharing of data or information and other resources. (4 marks)

- (d) Differentiate between deterministic and random systems giving examples in each case. (4 marks)

(Total 20 marks)

QUESTION EIGHT

- (a) The owner of a chain of auto-accessory shops in five different towns inputs sales figures into a computer model that displays the selling trends of each store. She uses her own observation from visits to the shops and information gained from the model to make ordering decisions for each store.

Required:

Are the ordering decisions she makes structured, semi-structured or unstructured? Briefly explain the reasons for your choice and outline what product related variables are involved in the ordering decisions. (10 marks)

- (b) Certain financial problems such as simplified break-even analysis models for predicting profits can be computerized.

$$P = (S_p - V_c) U - F_c$$

Where:

P	=	Profits
S _p	=	Selling price per unit
V _c	=	Variable cost per unit
U	=	Number of units of sales
F _c	=	Fixed cost

Required:

Using the above model, describe any three decisions that management can make from the break-even analysis model. (6marks)

Why do organizations automate reasoning or decision-making tasks which human beings are naturally better able to perform than computers? (4 marks)

(Total: 20 marks)

KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS
BOARD

INFORMATION COMMUNICATION TECHNOLOGY

June 2013

QUESTION ONE

- (a) In a systems development life cycle, the systems analyst is interested in finding out the organization's objectives and exploring the nature and scope of the problems under study during the feasibility stage.

Required:

- (i) Explain three objectives of a feasibility study. (6 marks)
- (ii) Explain the methods used by the systems analyst in defining the objectives of an organization. (6 marks)
- (b) The increased use of multimedia technology can be largely attributed to the easy-to-use presentation software together with the decreasing costs of the necessary hardware such as LCD projection panels and laptop computers.

Required:

- (i) State four elements of multimedia technology. (4 marks)
- (ii) Explain two major uses of multimedia technology. (4 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Explain the role of information communication technology in business process re-engineering. (6 marks)
- (b) Dunga Beach Sacco Ltd., a farmers savings and credit co-operative society based in Kisumu Municipality installed an enterprise resource planning (ERP) software two years ago. At the time of installation, the Sacco did not undertake the necessary business process changes, as a result of which most users still prefer to use the manual system. The Sacco is now planning to undertake the necessary changes.

Required:

- (i) State four obstacles that may have hampered the business process changes and suggest four possible strategies that may be used to overcome the obstacles. (8 marks)
- (ii) A post installation review of the system revealed that the system was not realizing the anticipated benefits. List six other key areas that the review should have focused on other than the benefits. (6 marks)

(Total: 20 marks)

QUESTION THREE

- (a) Auditing information systems by a company's internal auditing staff or external auditors is aimed partly at evaluating whether proper and adequate security measures and management policies have been developed.

Required:

- (i) Define the term 'electronic audit trail'

- (ii) Differentiate between auditing around the computer and auditing through the computer and explain the approach which uses electronic audit trail.
 - (iii) State four skills required of information systems auditors. (4 marks)
- (b) Explain the factors that have led to the decentralization of information systems functions.

(8 marks)

(Total: 20 marks)**QUESTION FOUR**

- (a) Most computers in use today have open architecture which enables users to open them easily and install new devices. The need to buy new computers is reduced since the existing capability may be enhanced using expansion slots on the computer motherboard to plug in expansion cards.

Required:

- Describe any three types of expansion cards. (6 marks)
- (b) List four scanning devices and explain how a scanning device works. (8 marks)
- (c) Digital video disk (DVD) is a relatively new type of data storage device that may be used for diverse data storage tasks.

Describe three characteristics of a DVD.

QUESTION FIVE

- (a) In a file set up or development process, the file's structure is defined and its contents identified. The four characteristics considered in defining the structure and identifying the contents in a file set up or development process are; volatility, activity, size and growth.

Required:

- (i) Using the example of a payroll file, explain the terms; volatility, activity, size and growth. (4 mark)
- (ii) Explain how each of the characteristics in (i) above may influence decisions to do with a file structure design and in planning whether the mode of access should be sequential, indexed sequential or random. (8 marks)
- (b) Organizations use different options of human computer interfaces such as GUI, command driven or special interfaces. Define GUI and state its advantages. (8 marks)

QUESTION SIX

- (a) Explain three ways in which modern information communication technology (ICT) has affected the portability of information. (6 marks)
- (b) Outline any two anomalies that are associated with redundant data. (2 marks)
- (c) Explain the type of information that should be maintained for the post-implementation review of a system. (6 marks)
- (d) Explain the importance of artificial intelligence (AI) to a developing country. (6 marks)

QUESTION SEVEN

- (a) A washing machine is designed to rinse and spin clothes for some pre-determined intervals regardless of whether the clothes are clean or not.

Required:

- (i) Using the general systems theory, indicate whether this is an open loop or closed loop control system. (4 marks)
- (ii) Explain the importance of open loop and closed loop control concepts in the context of a business system. (4 marks)
- (b) Explain how the following systems development tools or techniques can assist a systems developer to reduce an application's development period and costs.
 - (i) Fourth generation languages (4GLs). (3 marks)
 - (ii) Prototyping (3 marks)
 - (iii) Computer aided software engineering (CASE) tools. (3 marks)
- (c) Explain three major benefits of mobile banking (M -banking). (3 marks)

(Total: 20 marks)**QUESTION EIGHT**

Witu Ltd., a motor vehicle spare parts dealer, has its head office in Nairobi. The company has eight branches in Kenya, two in Uganda and one in Rwanda. To enable the branches share data and other resources, the company has a large database that is replicated in the computers located in the branches. These computers are interconnected through data communication networks. The database is centrally administered from Nairobi but the branches have flexibility and may customize the database to meet their needs.

Required:

- (a) State the type of database used by Witu Ltd. (2 marks)
- (b) Explain the business reasons that may have encouraged Witu Ltd. to use this database. (6 marks)
- (c) State and briefly explain advantages and disadvantages of the database used by Witu Ltd. (12 marks)

(Total: 20 marks)

**KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS
BOARD**

IFORMATION COMMUNICATION TECHNOLOGY

December 2013

QUESTION ONE

- (a) The term **computer** describes a device made up of a combination of **electronic** and electromechanical components. By itself, a computer has no intelligence and is referred to as hardware which means simply the physical equipment. The hardware cannot be used, until it is connected to other elements, all of which constitute the six parts of a computer-based information system.

Required:

Describe the six components of a computer-based information system. (12 marks)

- (b) Any communication network, such as a telephone system, can be connected to others. This is an example of connectivity, the ability to connect computers, telephones and other devices to other computers, other devices and sources of information. It is this connectivity that is the foundation of Information Age. Connectivity has also made many activities possible.

Required:

Explain any four activities that have become possible because of connectivity. (8 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Explain the role of senior management during systems implementation. (6 marks)
- (b) Locating computer hardware, software and information communication staff in one area realizes a number of benefits to an organization. (2 marks)

Required:

Explain the nature of the following advantages:

- (c) The firm you work for is in the process of designing a customer database in order to improve its debts management.
Name any eight important customer details that would constitute this database system.

8 marks)

(Total: 20 marks)

QUESTION THREE

You have been appointed the internal auditor of a bank. The bank has several computerized systems networked in a distributed network system. There is need to review the various controls existing within the systems.

- (a) Outline six main areas that the review should cover. (6 marks)
- (b) Describe how you would carry out your audit procedures using the following computer assisted audit techniques (CAATs):
- (i) Parallel simulation (3 marks)
 - (ii) Embedded Audit Module (3 marks)
- (c) Explain why you may have some difficulties in auditing distributed systems. (8 marks)

(Total: 20 marks)

QUESTION FOUR

Farmquip Ltd. designs and manufactures irrigation equipment. The irrigation equipments are sold to flower nationality. The company regards customer service, that is the ability to respond effectively and properly to service calls as critical to its success.

Initially, field engineers inspect faulty irrigation equipment. Currently three quarters of the faulty irrigation equipment are referred to the repair centre, to be mended by the repair centre.

Engineers, resulting in a turnaround time of up to 10 days. The company has decided to investigate the possibility of carrying out more field repairs with the aid of a portable expert system, in order to reduce the turnaround time.

The prototyping approach was used, and an evaluation of the final prototype made it clear that an expert system used in conjunction with 11.1ptop microcomputer would improve the situation to the extent that only 10% of irrigation equipment would need to be returned to the repair centre, with majority of repairs being carried out at the customers' premises by the field engineers.

Required

- (a) Define the term expert system and explain how it could be of use in this context. (4 marks)
- (b) What is meant by prototyping? Briefly comment on its advantages and disadvantages and explain how this approach is used. (4 marks)
- (c) Discuss the changes that would take place if the expert system was implemented in terms of position, status; tasks and responsibilities of engineers at the company's repair centre and in the field. (12 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) Lack of historical data and prior knowledge of an information system makes it difficult to estimate the cost of an information systems project.

Required:

Formulate a checklist that could assist an organization in identifying, quantifying and evaluating information systems costs. (12 marks)

- (b) The basic objective of user interface is to minimize the human error during data entry.

Required

- (i) Explain the error control measures that should be incorporated into a user interface. (4 marks)

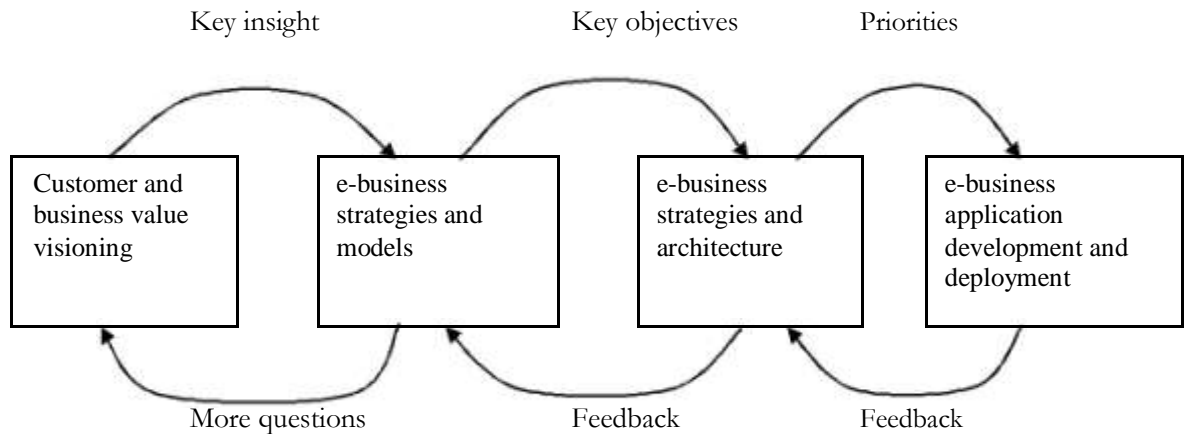
- (ii) What are the implications of the error control measures in (i) above?

(4 marks)

(Total: 20 marks)

QUESTION SIX

The following diagram illustrates the e-business planning process, which focuses on discovering innovative approaches to satisfying a company's customer value and business value goals:



The planning process leads to development of strategies and business models for new e-business and e-commerce platforms, processes, products and services. The company can then develop IT strategies and an IT architecture that supports the building and implementation of the newly planned e-business applications. Such an e-business planning process has three major components one of which is information technology architecture.

Required:

- Describe the other two e-business planning process components. (4 marks)
- State and explain the four major components of the information technology architecture component. (8 marks)
- The e-business application development and deployment process involve some activities that should be properly managed for the e-business planning process to be completed successfully.
List and briefly explain these activities. (8 marks)

(Total: 20 marks)

QUESTION SEVEN

During output design, the designer's ideas are put to test. Some ideas are essential while others are dictated by circumstances.

Required:

- State the general principles applied in output design. (2 marks)
 - Outline the —Steps taken in designing an output. (6 marks)
- Describe the options available for the analyst to use when implementing an output (8 marks)

-
- (c) Systems development projects are usually triggered by:
- (i) Problems
 - (ii) Directives

Explain the meaning of these terms in the context of systems development.

(4 marks)

(Total: 20 marks)

QUESTION EIGHT

E-banking or on-line banking is one of the newest financial products in the Kenyan financial market. Commercial banks are outdoing each other in order to capture a bigger share of the market. They target middle aged individuals with steady incomes and who appreciate the impact of information communication technology (ICT) in their day to day lives. These individuals have access to mobile telephones and computer terminals connected to the internet.

Through on-line banking, the individuals can pay their rents, insurance premiums, mortgages and a host of other payments without ever going to a banking hall or even to an automated teller machine (ATM). This adoption of on-line banking has resulted in increased cases of on-line frauds.

Required:

- (a) What is meant by on-line fraud? (2 marks)
- (b) Discuss security measures which could be adopted by businesses and individuals involved in e-banking/on-line banking. (18 marks)

(Total: 20 marks)

ANSWERS - PAST PAPERS

SUGGESTED SOLUTIONS TO JULY 2008

QUESTION ONE

a) **Competitive strategy**

This refers to a strategy, which enables an organization to gain a competitive advantage. Competitive strategies that would be addressed by information technology:

1) Differentiation strategy

This strategy aims at producing goods and services, which distinguish an organization from its competitors in terms of quality. Design software could be used to produce unique products that distinguish and organization.

2) Cost leadership/low cost production

This strategy aims at minimizing production costs so as to maximize profit. Low cost production could be achieved through sound managerial decisions, which are supported by software systems such as decision support systems or expert systems.

1) Forming alliances

Alliances are aimed at making an organization stronger amongst its competitors. Information technology could sustain and alliance through fostering effective communication via communication hardware and software.

2) Growth strategy/ Globalisation

This strategy aims at tapping foreign markets. Information technology has enabled globalisation via the Internet. Companies can now offer their products and services to a distant clientele via e-commerce sites.

3) Lock-in strategy

This strategy aims at having a firm grasp of the customers of an organization thus making it difficult for them to switch to competitors. IT applications could be used to 'lock-in' customers by introducing switching costs (e.g. costs of changing telecommunication links, cost of changing hardware and software)

b) Tangible benefits can be quantified. These include:

- 1) Increased productivity.
- 2) Lower operational costs.
- 3) Reduced workforce.
- 4) Lower computer expenses.
- 5) Lower outside vendor costs.
- 6) Lower clerical and professional costs.
- 7) Reduced rate of growth in expenses.
- 8) Reduced facility costs.

Intangible benefits are difficult to quantify. These include:

- 1) Improved asset utilization.
- 2) Improved resource control.
- 3) Improved organizational planning.
- 4) Improved organizational flexibility.

- 5) More timely information.
- 6) Increased organizational learning.
- 7) Legal requirements attained.
- 8) Enhances employee goodwill.
- 9) Increased job satisfaction.
- 10) Improved decision making.
- 11) Improved operations.
- 12) Higher client satisfaction.
- 13) Better corporate image.
- 14) More information.

c) Ethical and societal dimensions to the development and use of information technology:

- 1) **Information rights and obligations:** What information rights do individuals and organizations possess with respect to information about themselves? What can they protect?
- 2) **Property rights:** How will traditional intellectual property rights be protected in a digital society in which tracing and accounting for ownership is difficult, and ignoring such property rights is so easy?
- 3) **Accountability and control:** Who can and will be held accountable and liable for the harm done to individual and collective information and property rights?
- 4) **System quality:** What standards of data and system quality should we demand to protect individual rights and the safety of society?
- 5) **Quality of life:** What values should be preserved in an information system and knowledge-based society? What institutions should we protect from violation? What cultural values and practices are supported by the new information technology?

QUESTION TWO

a) Decision Support System (DSS)

This refers to an information system that supports managers in day-to-day decision-making, particularly in semi-structured problem solving. DSSs emphasize on small simple models, which can easily be understood and used by managers, rather than complex integrated systems that need information specialists to operate.

Functional characteristics:

1. They provide **analytical capabilities**. DSSs are built explicitly with a variety of models to analyse data, or they can condense large amounts of data into a form, which can be analysed by decision makers.
2. They present information in **simple graphical form** and they may also include tabular representation.
3. They combine both **internal and external information** to support decision-making. External information for a DSS such as a voyage estimating system could include port rates, fuel costs, and port distances. Internal information could include freight rates for various types of cargo, labour costs, fuel and water consumption, etc
4. The DSS only provides support to decision making by providing timely information. It doesn't, however, perform decision-making.
5. They are suited for **semi-structured problems** e.g. a voyage estimating system could answer the question: Given a customer delivery schedule and an offered freight rate, which vessel would be assigned and at what rate in order to maximize profits?

6. They are developed with the participation and often, by individual managers or a group of managers to support a range of decisions of concern to them.
7. They're common where effective problem solving is enhanced by interaction between computer and manager.

b) Types of accounting information systems which DSS may address:

- 1) Budgeting systems.
- 2) Cash management systems.
- 3) Capital budgeting systems.
- 4) Investment management systems.
- 5) Financial condition analysis systems.

c) **Prototype**

This refers to a preliminary working version of an information system for demonstration and evaluation purposes. Steps in prototype development:

1) Identification of user requirements

The system designer (Usually an information systems specialist) works with the user only long enough to capture his or her basic information needs.

2) Development of an initial prototype

The systems designer creates a working prototype quickly, using forth-generation software, interactive multimedia or computer aided software engineering (CASE).

3) Use of the prototype

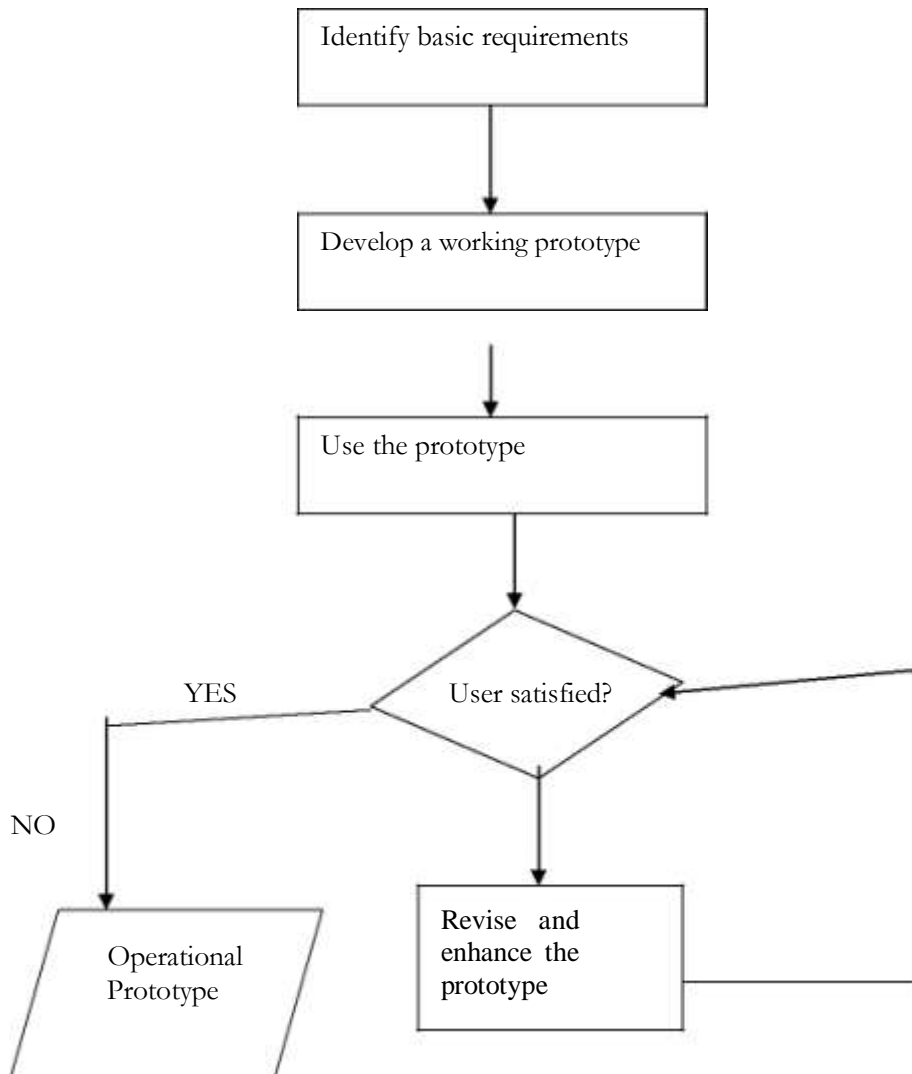
The user is encouraged to work with the system in order to determine how well the prototype meets his or her needs and to make suggestions for improving the prototype.

4) Revise and enhance the prototype

The system builder notes all the changes the user requests and refines the prototype accordingly. After the prototype has been revised, the cycle returns to (3). (3) And (4) are repeated until the user is satisfied.

When no more iterations are required, the approved prototype then becomes an operational prototype for the application. Sometimes the prototype itself is adopted as the production version of the system.

Diagram:



QUESTION THREE

a) **Business process re-engineering**

This refers to the fundamental rethinking and radical redesign of business processes so as to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

Business process engineering

This refers to the creation of business processes aimed at achieving an organization's strategic, tactical and operational goals.

b) **Telecommuting**

It's basically home-working. Telecommuting is an application of information technology whereby employees can be able to undertake their activities without having to go to the office. For this to

happen, the employees will have to be connected to the organization's systems. This is facilitated through the use of communication networks.

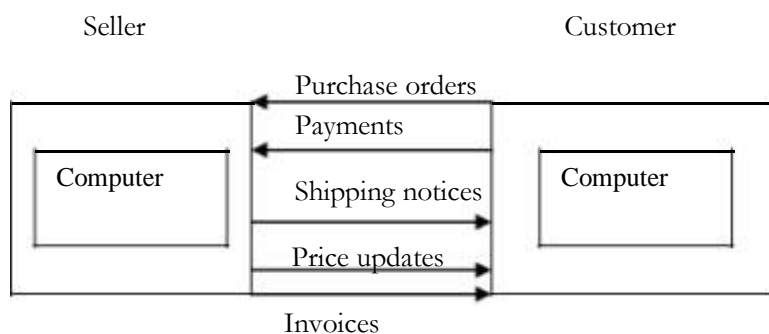
Applications:

- Programmers developing a system could use it. A programmer could work on his/her module from home.
- It could also be used by other office workers who for some reason or the other cannot be able to make it to the office e.g. due to sickness, leave, or when the office is closed after working hours (during a weekend or public holiday).

Electronic Data Interchange (EDI)

This refers to the direct computer-to-computer exchange between two organizations of standard business transaction documents.

EDI could be used to exchange documents such as invoices, bills of lading, or purchase orders as shown in the following diagram:



EDI enables speedy and more efficient transactions since it facilitates the quick exchange of business documents.

Computer conferencing

This facility is similar to e-mail but more expensive in that there is a huge mailbox system where all persons connected to the system can be able to deposit messages for people to see what other people have left on the system.

Computer conferencing is appropriate for people undertaking a project so that they can be able to leave progress reports for each other. Computer conferencing also provides an organizational wide bulletin board where members can leave messages of general importance.

QUESTION FOUR

a) End user computing

This refers to the development of information systems by end users with little or no formal assistance from technical specialists. End users utilize fourth-generation languages, graphics languages and PC software tools to develop information systems.

b) Risks associated with end user computing:

1) Risks in problem analysis.

Users may proceed to solving problems without adequate problem specifications.

2) Development risks.

Persons who do not have systems development training and experience are more susceptible to modelling errors. They may fail to apply documentation standards and test their system adequately.

3) Redundancy

End users may spend time and effort developing applications that have already been developed by commercial software firms.

4) Unprofitable expenditure of time and effort.

It's questionable whether people with professional skills other than systems development should spend time developing applications rather than concentrate on their areas of expertise.

5) Waste of computing resources

Without proper budgetary restraints, the use of end user computing resources may be uneconomical.

6) Threats on privacy and security

Physical access, custodianship controls, backup and recovery issues are seldom addressed by end users.

7) Lack of computing efficiency and effectiveness

Few end users establish procedures for evaluation of their systems or subject them to audits.

8) Incompatibility of end users tools and devices with the rest of the organization's systems. Standards are required to overcome this.

c) (i) Information resource centers

These are special facilities housing hardware, software and technical specialists to supply end users with tools, training and expert advice so they can create information system applications on their own to increase their productivity. Specific services include:

- Problem resolution especially where the information center has a help desk.
- Training of end users on the use of hardware and software.
- Consultation especially hardware and software consultation.
- Technical support relating to hardware and software installation.
- Product support where they have software within their department, which people (end users) can access.
- Hardware access e.g. Printers. Information centers make them shared at a central physical location and also over the computer network.
- Staffing: They can provide staff to user departments so that work can be carried out.
- Computer resource planning and justification.
- New service evaluation – The center's staff assess new user needs and provide for them through products/services.

(ii) Object oriented programming

This refers to an approach to software development that combines data and procedures into a single object. The object combines data and program code. Instead of passing data to procedures, programs send a message for an object to perform a procedure that is already embedded in it. A message may be sent to many objects, but each will implement that message differently. Object oriented programming produces reusable program code or software chips that can be used in other related systems.

The reusability facility provided by OOP promotes end user computing. End users could conveniently use objects stored in reusable software libraries explicitly designed for reuse instead of going through the long process of coding which most end users are not capable of. Reusability comes in handy when end users are dealing with visual objects (command buttons, menu boxes, list boxes, etc). OOP enables end users to easily create programs with graphical features.

QUESTION FIVE**a) Program development life cycle**

This refers to the steps that have to be followed in coming up with an application program. These steps are followed irrespective of whether the program is developed in-house or not. The program development life cycle consists of the following stages:

1. Problem analysis.
2. Program design.
3. Program coding.
4. Program testing.
5. Program documentation.
6. Program maintenance.

The first stage of the program development cycle i.e. the problem analysis phase is primarily concerned with establishing why the program is being developed. The objectives of the program are documented. The process of establishing program objectives involves gathering information from end users. The end product of this stage is the program definition document.

Once the requirements of the program to be developed have been understood, the second phase is to design a program that meets those requirements as documented in the first stage. Tools that may be utilized in program design include program flowcharts and structured English statements. The end product of the design phase is the program design specification.

Program coding is concerned with turning the program design into program code (in a high level language). The systems analyst and the programmers work together to decide on the programming language to use. The end product of the coding phase is program code.

Program testing is concerned with locating errors in the program so that the errors can be fixed to reduce future program maintenance costs, to create customer confidence, to improve system reliability and to improve program quality. The end product of the testing phase is an improved program in terms of reliability.

Program documentation involves producing documents that describe the delivered program. Program documentation also involves producing documents that contain the outcomes of the other phases of program development i.e. problem analysis, program design, program coding, and program testing. Documents that are produced include program user guides, program specification and program documentation (Contains a technical description of the developed system for use by programmers for purposes such as maintenance). The program documentation phase is thus an on-going phase featuring from the start to the end of the program development life cycle.

Program maintenance includes the correction of faults that existed in the program before its delivery as well as changes to improve performance or to adapt the program to a changing environment (hardware and software environment). The end product of the program maintenance phase is an improved system.

b) How CASE tools improve programming productivity:

1. They automate code generation, testing and control rollout thus enabling programmers to accomplish their tasks within a short period of time.
2. They automate tedious and error-prone portions of analysis and design thus freeing programmers to more creative problem-solving tasks.
3. They organize and correlate design components and provide rapid access to them via a design repository thus facilitating group collaboration.
4. They improve communication between users and technical specialists thus resulting in quality systems being developed.

c) Areas of interest addressed by a structured walkthrough:

1) **Program requirements**

The structured walkthrough uncovers any inconsistencies between requirements stated by the users and those that the analyst is proposing.

2) **Program designs**

Structured walkthroughs determine whether the proposed design will meet requirements of the system and user. If the review team finds any discrepancies between the design and the requirements, they should provide solutions to the discrepancies.

3) **Programs**

The structured walkthrough is conducted to examine the program development along with its documentation. The programs are compared with their specific design specifications to determine whether the specifications are being satisfied. Any programming errors are dealt with.

4) **Testing**

The structured walkthrough assists in development of test data that can be used to detect system design errors.

QUESTION SIX

a) **Critical path**

This is a term used in project scheduling in relation to network analysis diagrams (a general term that includes techniques such as critical path analysis/critical path method (CPM), and Project Evaluation and Review Technique (PERT) charts). In a network analysis diagram, the critical path is defined as one with the following characteristics:

1. The earliest starting times (ESTs) and the latest starting times (LSTs) of all events along the path are equal.
2. The sum of the activity durations of all activities along the path is greater than all other parts.
3. All activities along the path have no float (amount of slack time associated with a non-critical activity).

All activities along the critical path are critical since we cannot afford to take longer than the time allocated without affecting the project completion time.

Note:

An activity is an undertaking that consumes time. An event is a point in time that signifies the end of a series of activities or the start of a series of activities.

b) Role of project management:

1. **Planning**

This involves laying down the framework for the development of a project or part of it. It includes specific tasks, which include forecasting, establishing objectives, devising strategies, developing policies and setting goals.

2. **Monitoring and Control**

It aims at ensuring actual results are consistent with planned results. Monitoring involves assessing the progress of the project to determine if there are any differences between actual and planned results. The control function on the other hand ensures that the project is progressing as planned and the project team is performing better than planned.

3. **Organization**

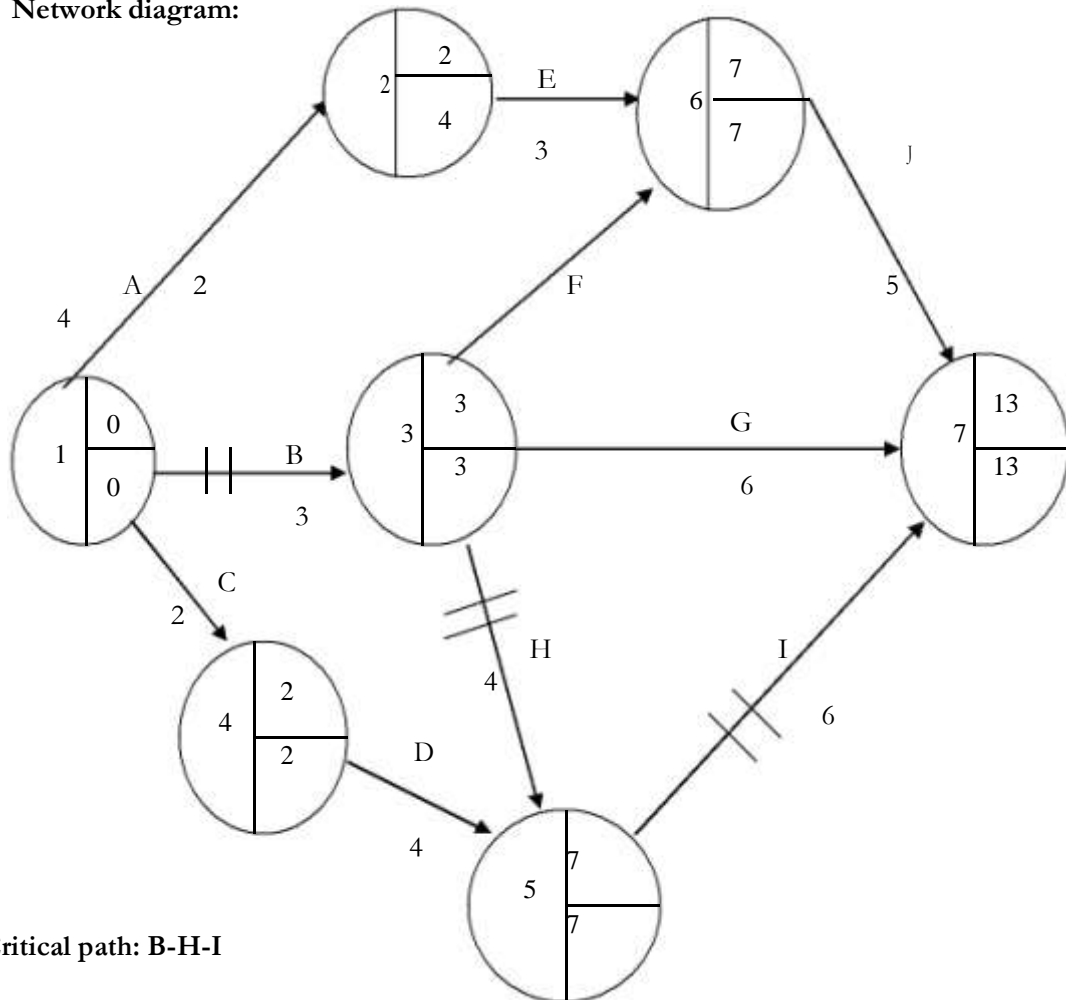
This ensures that the various elements involved in a project i.e. staff, management, and infrastructure are working together in harmony and that proper infrastructure is in place to ensure the same.

4. Staffing

This function is centered on Human Resource Management (HRM), which involves looking into wages, hiring and firing procedures, training of staff, provision of a right environment, etc

5. Directing

This involves the process of motivation, leading, guiding, etc, which positively influence subordinates.

a) **Network diagram:****QUESTION SEVEN**a) **User interface**

It contains:

- **Screen designs**- the design document contains presentation features such as text, colour, highlighting, graphics and animations.
- **Dialogs**- a dialog is a set of procedures for exchange of information between users and the computer. The design document contains the types of dialogs in the information system under development e.g. menu based, form filling, command language, and natural language dialogs.

Data

It specifies whether the data is stored in conventional files or databases. It also specifies the types of files in the information system i.e. whether there are master files (contain records or

information of long-term value to the organization), transaction files (contains temporary records which represent the operation of the organization for a particular period of time), archive files (keeps offline storage), and audit files (shows all the operations performed on the system). The design document also specifies the media that is used to store the systems data e.g. tape, magnetic disk, optical disk, etc. Finally the design document specifies how records are organized in the file i.e. whether serial, sequential, random, inverted files or index-sequential organization is used.

Process

The design document contains a detailed breakdown of the systems processes showing the steps that constitute the each process. The design document also specifies the input, processing and output involved for each process. Error conditions and the recovery procedures are also specified for each process.

b) Computer related crimes that an organization should be aware of:

1. **Theft of computer resources (hardware and CDs containing software).**
2. **Introduction of viruses.**
3. **Disruption of computer systems.**
4. **Theft of services.**
5. **Hacking.**
6. **Spamming** - usually targets organizations connected to the Internet. Marketers send out unsolicited mass e-mail to recipients who have not requested the information.
7. **Jamming** - Targets organizations connected to the Internet. Jammers use software routines to tie up the computer hosting a website so that legitimate users can't access the site.
8. **Malicious software** - Targets organizations connected to the Internet. Cyber vandals use data flowing through the Internet to transmit computer viruses, which disable the computers they infect.
9. **Spoofing** - targets organizations linked to the Internet. Spoofers fraudulently misrepresent themselves as other organizations, setting up false websites where they can collect confidential information from unsuspecting visitors to the site.
10. **Sniffing** - targets organizations linked to the Internet. Sniffing, a form of eavesdropping, involves placing a piece of software to interpret information passing from a user to the computers hosting a website. This information can include credit card numbers and other confidential data.

QUESTION EIGHT

a) Electronic commerce

It refers to the process of buying and selling goods and services electronically involving transactions using the Internet, networks, and other digital technologies.

b) (i) Automated Teller Machines (ATMs)

They have made it possible for individuals to pay for their utilities (e.g. electricity, telephone services, water) electronically.

(ii) Electronic Data Interchange (EDI)

EDI has facilitated the quick and convenient exchange of documents and payments in e-commerce. Such documents include purchase orders, shipping invoices, and shipping notices.

(iii) Internet

This is an international network of networks that is a collection of hundreds of thousands of private and public data networks.

The Internet provides the link between the seller and buyer that is required in e-commerce.
The Internet has bridged geographical barriers.

c) (i) Website

This refers to all the World Wide Web pages maintained by an organization. The World Wide Web is a system with universally accepted standards for storing, retrieving, formatting and displaying information in a networked environment.

Websites could be maintained to aid other Internet users to search information, for purposes of e-commerce, for purposes of advertising an organization's products and services, to enable Internet users access e-mail facilities, etc. Websites usually contain stylish topography, colourful graphics, push-button interactivity and sound and video to lure Internet users to browse (view) their content. Examples of common websites include: www.yahoo.com (for e-mail), www.google.com (for searching information), www.amazon.com (for e-commerce) and www.skynews.com (for news).

(ii) Cyber café

This refers to a facility that enables individuals to access and use the Internet at a cost. Cyber cafés are usually in the form of a small building or a small room with several computers linked to the Internet. Individuals usually access the Internet for short periods ranging from a few minutes to one or two hours. The cost varies with the total time of access. Other services provided by cyber cafés include:

- Photocopying
- Printing
- CD writing
- Scanning
- Typing of documents

(iii) Network Browser

This refers to an application program that enables a user to access and view contents of a website. Examples of web browsers are Microsoft Internet Explorer and Netscape Navigator.

MODEL ANSWERS TO THE PAST CPA PAPER SET IN DECEMBER 2008
QUESTION ONE

a) Organisation information systems

Application of each system for the following functional areas of business

i) Sales and marketing

- Transaction Processing Systems (TPS) – Recording cash sales.
- Management Information System – Production of exceptional report, for example, when sales go below the normal average.
- Decision Support System – Designing a marketing strategy. For example, through advertising, product differentiation etc.
- Executive Information Systems – Determining competitor's strategies.
- Expert systems – solving marketing problems for example the most feasible marketing method.

ii) Finance

- Transaction Processing Systems – solutions to short-term sources of finance for example, bank overdraft, or short-term loans.
- INFORMATION COMMUNICATION TECHNOLOGY (MIS) – Provision of information regarding the various sources of finance available to a business. These may include commercial papers, debentures corporate bonds etc.
- Decision Support System – evaluation of the cheapest sources of finance so as to undertake a given project.
- Executive Information System – Evaluation of the date of return of a project and measuring it against the company's cost of capital.
- Expert Systems – Solution to financing problems and projects selection. For example, the system will determine projects with the highest present values.

b) Impact of end user computing on an organisation's information technology function.

End user computing refers to direct hands on use of computers by users and not indirect use through computer professionals. It presupposes that computer users who are not specialists solve their day-to-day problems without going through computer experts.

The following are the impacts that end user computing has resulted in the information technology functions:

1. End user computing has resulted to overwhelming requests for assistance in the information technology department thus making the information technology staff to divert their attention from more important aspects thus delimiting its effectiveness.
2. It leads to mismatching of user problems and computing alternatives for system development. For example, personal computing and mainframe packages.
3. End user computing has also led to lack of concern about equipment security and this has cost dearly to the information technology functions.
4. Since end user computing is piece meal in nature, the information technology function cannot adequately maintain user-developed systems.
5. End user computing results to systems administration difficulties since the information technology functions cannot adequately control the use of facilities by users.
6. There is also the problem of lack of integration between the information technology management of personal computing and mainframe end user computing. Thus, end user computing may not be meaningful to the development of information technology.

- c) Examples of activities end users might not be responsible for
- 1) Computer systems security design and controls
 - 2) Systems development as well as program development
 - 3) Provision of training to fellow end users.
 - 4) Advising the company where new IT projects might be beneficial.
 - 5) Systems maintenance.

QUESTION TWO

- a)
- i) Guidelines required for the development of a prototype.
A prototype is a small version of the proposed system and is used to test the basic operation and suitability of the system. It is a model of all or part of a system built to show users during design stage how a system will appear.

The guidelines for the development of a prototype include: -

1. Formulate a work with manageable modules
 2. Build a prototype rapidly otherwise, it might spend equivalent time to that of the traditional system development.
 3. Develop a prototype that must support modifications i.e. creating the prototype in modules that are not highly interdependent.
 4. The user must be involved and interfaced with the prototype.
 5. The prototype must be real and live working applications which can perform actual work.
 6. The development of a prototype must be primarily to test and capture user's requirements and so it must be inclined to that end.
 7. The prototype should be cheap to build otherwise it might make the system development unnecessarily costly thus outweigh the benefits to accrue from it.
 8. It should relate to the actual system being developed in all aspects and in a simplified manner so as to make easy the process of capturing user requirements.
- ii) Facilities found in the fourth generation languages 4GLs and their application in developing a prototype system.

Fourth generation language refers to software intended to help computer users or computer programmers to develop their own application programs more cheaply and quickly.

Some facilities found in the 4GLs include:

1. Graphical User Interface (GUI)

These are computer-based tools which are designed to enhance personal computing work. They reduce the need for technical training requirements. These facilities can be used during prototyping to come up with simple models of the system more easily and quickly.

2. Application Generator

This is a facility provided by the 4GL used to create complete application program. It provides a flexible means to parameterise a general software packages to deal with particular situations. The user describes his requirement and the data file to be used and it is upon the application generator to meet the described requirement. This 4GL facility can be utilised during prototyping in:

- using a number of standardised segments so as to provide a common function

- producing applications relatively quickly. This has an implication on cost and time of such a task which are key aspects of prototyping.
3. **Non procedural language**
This is a facility of 4GL which allows users to make a request to the system. It is up to the 4GL to meet the requirement as specified by the user.
 4. **This can be utilised during prototyping to come up with an application more quickly and cheaply** since no procedure specifications are required to meet a particular requirement.
- b) Use of information technology in bringing about improvements in productivity within a business organisation.
- i) Information technology can be used as part of the commercial strategy in the battle for competitive advantage. For example, IT can be used to improve productivity and performance through the use of computer aided designs (CCAD) and computer Integrated Manufacturing (CIM)
 - ii) Information technology has generally succeeded in reducing the costs of information processing. This has an impact on the overall costs of the organisation thus commercial organisations can be able to operate more economically and thus improve productivity.
 - iii) Information technology has brought about greater speed/accuracy and efficiency in data processing and availability of information thus generating speeding up the production process and improved production.
 - iv) Use of information technology involves the use of machine systems which ensure greater or high level of diligence and ability to perform tasks without fatigue or tiredness. Some more recent technology also allows for the automation of production processes thus improving the productivity of an organisation.
 - v) Information technology can also be used to generate new products and services so as to out with those competitors and gain a larger market share. I.e. through the use of computer aided designs (CADs).
 - vi) IT can also be used to lock out competitors so that larger market shares are obtained and greater productivity so as to satisfy new markets. This can be achieved through faster provision of services and delivery. For example, banks use automatic teller machines to improve customer services.
 - vii) IT can be used to commit customers to investment and reducing their likelihood of them changing suppliers. This ensures that the current customers are retained and new ones wooed. This is obviously achieved through the use of provision of quality and fast services to customers by utilising information technology such as the automated teller machines, electronic point of sale terminals etc.
 - viii) IT provides a straightforward performance advantage thus organisations are able to improve productivity.
 - ix) Routine processing can be done in bigger volumes at greater speed and accuracy.
 - x) IT improves the nature of management information in terms of its quality such that better production decisions are made.
 - xi) IT frees the workforce from more skilful and judgemental work such that they concentrate on more important duties of production.

QUESTION THREE

- a) Control techniques and their significance in the context of data security.

i) **Biometrics control**

These are controls that involve a high level of technology whereby the system identifies a user by recognising his biological characteristics. The most commonly available systems are voice

recognition systems which are able to recognise the user's voice and thus allow him access to the system. Also, biometrics systems are available which are able to recognise a user's eyes.

A system user needs only to focus his or her eyes before a beam of light which is displayed by the system input machine which then sends signals to the processor for the user authentication.

This form of control is important to data security that: -

1. It is accurate and cannot be forged by unauthorised users.
2. It is a fast way since keying of data is required.

ii) Encryption

This is a control technique which involves scrambling the data at one end of the line, transmitting the scrambled data and unscrambling it at the receiver's end of the line. Scrambling refers to transformation of data into codes and characters that cannot be read by an ordinary person. Data encryption is a way of preventing electronic eavesdropping or wire-tapping.

Encryption ensures data integrity which means that data is preserved in the same status as in the source document and has not been accidentally or incidentally destroyed or disclosed.

It also ensures privacy over data is maintained and individuals are assured of the control and use of their own information.

iii) Logical access

This refers to controlling those who have access to the terminal of a computer from gaining access to the data of a software. They are also known as data controls. They ensure that:

- Data is collected in full and with accuracy -
 - Data is held up to date
 - Data is processed in the right way to produce the required report. -
 - Reports are generated at the required time.
- Some examples of logical access controls include:

1. **Password:** - This is a set of characters, which may be allocated to a person, terminal, or facility and which must be keyed in before access is permitted. It is used to identify the user and check the user authority.
 2. **Personal identification numbers (PIN).** This refers to a set of characters which must be keyed in to the system to allow further access to the system. They are allocated to each individual user of the system.
- b) Objectives of application controls and the techniques within each to ensure maintenance of maximum feasible levels of control

1. Input controls

These controls ensure that there has been a complete and accurate conversion of data from the source document to the input media. The checking needs to detect missing data or incorrect digits or any type of deviation in the entry.

Input techniques include:

- i) Transaction codes: - In any organisation, data represents people, events, assets, objects etc. and so codes can be allocated to each transaction document, field record or file.
- ii) Form design: - When a source document is required for the collection of data, this form can be designed to force more legible entries by the use of individual blocks for each character to be recorded.
- iii) Verification: - Source documents prepared by the clerk can be verified or proof-read by another to improve accuracy. In a data conversion operation such as keypunching or keyboard to storage, a second operator can verify each document.
- iv) Control totals: - To minimise loss of data when it is being transported from one location to another or to check on the results of different processes control totals are prepared for specific batches of data.

- v) Check digits: - This control technique ensures maintenance of feasible levels of control through ensuring: -
 - a) That only data essential for the purpose of the system should be collected.
 - b) Only persons specifically authorised to have access to the data should do so and their use of the data must conform to that of the agreed system.
 - c) Strong security measures are applied to minimise the risks that the data is accidentally or deliberately distorted or revealed.

2. Processing controls

These are procedures incorporated into the program to ensure that there is complete and accurate processing of the data that has been entered into the system.

Processing control techniques include:

- i) The edit run: - This consists of a series of checks e.g. programmed checks which would include records counts control totals, hash totals, numerical fields, alphabetic data in alphabetic fields.
- ii) Limit checks and overflow tests: - These perform arithmetical accuracy.
- iii) Other checks to ensure that correct files are being processed by reference to external labels, internal labels and volume labels.

Feasible levels of control are achieved through:

- i) Ensuring that only beneficial systems are developed.
- ii) Ensuring that suitable operational and administrative controls are built into systems design.

3. Out put controls

These are controls established as final checks on the accuracy and completeness of the processed information. The following control procedures are related to output controls.

- i) An initial screening should be conducted to detect obvious errors.
- ii) Output should be immediately routed to a controlled area and distributed by any authorised persons to authorised person.
- iii) Output control totals should be reconciled to input control totals to ensure that no data have been changed, lost or added during processing or transmission, e.g. the number of input records divided for processing should equal the number of records processed.
- iv) Any highly sensitive output that should not be accessible by computer centre should be generated via an output device in a secure location away from the computer room.
- v) Control errors and exception reporting would also be part of output controls. These controls should specify how exceptions and errors should be handled.

The objectives of these controls to ensure feasible control levels are:

- a) To ensure that output is guarded against distribution to the wrong persons or unauthorised access thus data security is improved.
- b) To safeguard data privacy while disclosure may be costly to the organisation, for example, business secrets.

QUESTION FOUR

- a) Reasons why changes to a system are so necessary after they become operational

Amendments to the original system will almost inevitably occur in addition to the computerisation of additional company activities. The environment may be so dynamic in such a way that the system is rendered less meaningful than it should have been just the moment it is introduced. However, this can be due to a number of factors namely:

1. The process system development is so lengthy and complicated such that along time period such that the completion of the system, user needs may have changed or new and better systems may be available.
2. Due to the complexity of the system development life cycle lack of adequate expertise may render the system developed less meaningful and insensitive to its intended use.
3. User resistance may also act as a stumbling block to the proper use of the new system thus rendering it obsolete.

Reasons why changes to a system may be so necessary after it becomes operational.

1. The technology today is still considered to be at infancy and so as technology grows, there is the need to incorporate new and superior ideas into the system.
 2. The external environment such as government policies, consumer behaviour and suppliers expectations brings about changes in the external policies and requirements resulting to the adjustment of the existing system.
 3. Internal users expectations and requirements arising from management policy considerations could also result to changes of the existing system.
 4. The business industry to which a particular company belongs obviously consist of a number of players and so each will develop his own strategies to outwit the other. This battle for competitive advantage will result to adjustments and changes to the existing system.
 5. The existing system may develop internal control weaknesses such as the input, output, processing, storage and security limitation or a general dissatisfaction of the current system.
 6. The management may desire to obtain modern technological facilities or management advancement by acquiring new pieces of hardware for software which would result to efficiency and effectiveness of the current system.
- b) Two reasons why boot up programs are stored.

1. In Rom

Rom (read only memory) is a memory clip into which fixed data is written permanently at the time of its manufacture.

Bootstrap program refers to a computer start up program which is held in the form of a Rom.

The reasons why it is held in Rom include:

- i) New data cannot be written into the memory and so the data on the memory clip is unchangeable and irremovable. This means that data cannot be corrupted and so the system maintains its consistency.
- ii) Rom is a 'non volatile' memory which means that its contents do not disappear when the computer power source is switched off. This ensures that data is securely held and suffers no risk of getting lost. In this case, Rom chips will consist of items of software such as the computer operating system and various pieces of translation software.

2. On Disk

A disk is a storage medium which consists of a flat circular disk covered on both sides with a magnetic material. Data is held on a number of circular concentric tracks on the surface of the disk and is read or written by rotating the disk past read/write heads.

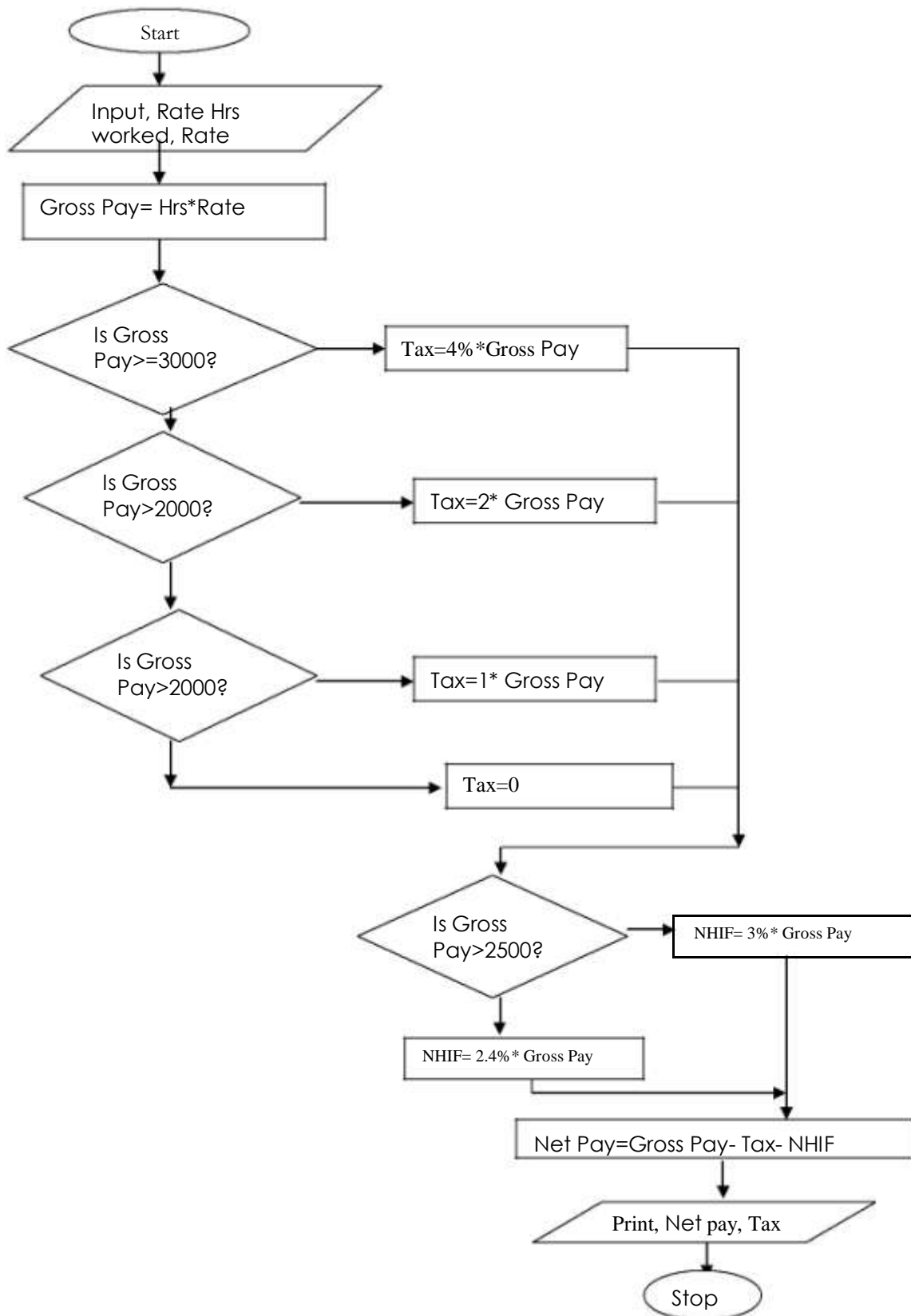
Disks can be used to store up boot-up programs due to the following reasons:

1. Disks have large storage capacities and can be written or read more quickly by the computer. This minimise the computer start-up time i.e. the Winchester disk contains a number of flat sealed airtight packs.
 2. Disk storage medium is less expensive than Rom storage media. For example, the magnetic disks can store substantial data, say a number of programs or lengthy programs.
- c) Functional characteristics and applicability of the backing store.
1. The backing store should be off sight meaning that files should be held in another separate location away from the computer room. This is to ensure that in case of any risk in the computer room, the back up data will be available.
 2. The backup storage media should be large and extensive enough so as to provide enough storage capacity. This s to ensure that adequate data is held in the store. For example, through the use of magnetic tapes.

-
3. Backing storage devices should facilitate easy retrieval of data. This is to ensure that in case of any loss of data from the main storage it can always be accessed and used within a short period.
 4. The backing store should be well maintained mostly by a librarian since it is the only source of data held in case that in the main storage is lost.

QUESTION FIVE

a) Flow chart



b) Purpose of programming standards

- i) To guarantee the quality of the systems that are developed
- ii) To ensure compatibility of systems (Allows for open systems development)
- iii) To ensure ease of maintenance of systems (given the proper documentation) and also upgrading when necessary
- iv) Facilitates re-usability of some of components- as these can be used across platforms.
- v) Helps to minimise redundancies e.g. training, development- as the systems developed tend to be similar
- vi) Reduces development time as some aspects are well documented- one is not discovering new standards

QUESTION SIX

- a) Explanations of the following concepts as relates to e-commerce.

Electronic commerce (e-commerce) refers to the use of information technology such as computers and telecommunications to automate the process of buying and selling of goods and services.

1. Electronic market

This refers to a situation whereby buyers and sellers who have subscribed to a networked system trade through their terminals. A buyer is able to access the webs of his suppliers and make orders through the internet.

2. Electronic purse

This refers to a vital envelope used to wrap electronic cash when it is being sent to the bank. When a customer makes an online purchase, electronic cash software creates a 'coin' in an amount specified by the user and sends it to the users bank wrapped in a virtual purse. The bank withdraws the amount specified from the user's account and deposits it to the seller's account.

3. Cyber banking

This refers to the use of electronic technology to facilitate banking transactions. For example the use of magnetic character readers (MCR) to accept and clear cheques. Also the use of automated teller machines.

4. Cyber mall

This refers to a collection of computer services offered by an external organisation in one roof. For example, services such as bureaux, internet access services, teleconferencing facilities etc.

- b) Benefits of e-commerce to consumers.

- 1. E-commerce reduces the amount of paperwork and clerical work that accompanies it. For example, the printing postage processing handling costs related to bills payment is reduced.
- 2. Transaction time is a significant factor and electronic transactions can save valuable time. Bills payment and cheques clearance can be sped up.
- 3. Networks such as the internet can transform a local business into a global distributor. In this case, consumers are better placed to access more suppliers who could offer them better terms more cheaply.
- 4. Consumers are saved of staff and other costs. Unlike paper based buying and selling which requires large clerical staffs to open envelopes, enter details of purchases etc. This improves organisation's profitability.
- 5. Closer consumer/supplier relationship is achieved thus consumers can negotiate for better terms such as discounts. This also speeds up transactions, for example, where a mechanic accesses an online catalogue of a spare part supplier so as to buy a particular one and fix it within the shortest duration possible.
- 6. E-commerce is easy to use and improves control. Online markets are easy to use because of the fact that systems are so easy to use compared with placing of telephone orders. Orders can be entered at any time 24 hours a day. This is convenient for the customer.
- 7. E-commerce improves the security of handling cash, for example, the use of e-cash is more reliable than the use of tangible cash which might be intercepted.

QUESTION SEVEN

a)

1. Steps of BPR

Business Process Re-engineering refers to the fundamental rethinking and radical redesign of business processes to achieve a dramatic improvement in measures of performance such as cost, quality, service and speed. It is a process of reorganising work so as to achieve a change, which would result to improvement.

The steps involved in Business Process Re-engineering are: -

i) Recognising the need for change in organisational design

Senior managers most in fact recognise whether re-engineering is really necessary and whether it would result to disruptive effect to the organisation. Organisation and people need some degree of stability in order to accomplish their tasks however, re-organisation may be necessary and failure to change may have a disastrous effect.

ii) Identifying the method of redesigning the organisation

The management may have at its disposal a variety of methods of redesigning and each alternative must be brainstormed so that the best alternative is achieved and chosen. The technique chosen should meet the needs of the organisation reacting to the external environment and identify what process will provide the greatest productivity in the organisation.

iii) Unfreezing the status quo

The current processes, benefits the individual persons as well as the design of the organisation must be unfrozen. Any resistance to change by organisational staff must be reduced.

iv) Moving to a new design and adopting new processes

Managers with authority to command that the new processes should be adopted and enforce their implementation by threats, punishments or close supervision. People implementing the change should make suggestions and should be encouraged to contribute and participate.

v) Re-freezing the old status quo

Persons involved in BPR should be convinced that it is their own and organisation's best interest. To accomplish this positive reinforcement such as praise or reward and punishments for those who revert to old processes should be instituted.

2. Role of information technology in BPR

Information technology can broadly be defined as the convergence of computer technology and communications technology. Information technology plays the following roles in Business Process Re-engineering:

1. The technological change with information systems is rapid and is likely to be superseded every few years with something even better thus organisations are forced to consider a policy of regular replacement of their systems. This may essentially involve a complete redesign of the information systems through business process re-engineering through utilisation of information technology.
2. The organisation may pursue a re-engineering process so that managers have access to more information which is likely to be more accurate reliable and up to date. To achieve this information technology is inherent in the design of INFORMATION COMMUNICATION TECHNOLOGY, for example, planning and control of the production department, for instance can be enhanced with such systems as Just In Time (JIT), Materials Requirement Planning (MPR), Computer Aided Designs and Computerised Stock control.
3. Business Process Re-engineering is aimed at achieving dramatic result in fundamental aspects of the business. In this case, strategic issues with the organisation looking for ways to gain competitive advantage can be reaped from information technology. This aims at attaining business maturity and the information technology function is seen more as a support function.

4. BPR could be aimed at improving customer service and information technology can provide just that especially since staff can handle customer queries by accessing the organisation's data files.
 5. The conventional ways of data processing especially manual systems have resulted in enormous backlogs and low processing of routine transactions. This can lead to the rethinking of management and the redesign of data processing processes to ensure speed and greater accuracy through the introduction of information processing technology by introducing computer systems.
 6. BPR results in increased decentralisation in the organisation whereby greater autonomy of individual subsystems is achieved. Information technology can be a vital tool in this aspect by allowing employees to share information in the database through networking.
 7. BPR also helps in the reduction in the number of controls and this can be achieved through the help of information technology. This is because the management of data is improved and security precautions enhanced.
 8. Empowerment of workers in decision-making and greater responsibility can be achieved through BPR. Information technology can be vital in this area, for example, through end user computing. Also, computer based information systems such as Decision Support Systems and Expert Systems can be utilised by less experienced staff members in making decisions of great quality.
- b) Important systems characteristics against which managers evaluate the success of an information system.
1. Economy
A good system must be economical or cost effective meaning that the tangible and intangible benefits delivered should outweigh all the costs involved in the development maintenance and administration of the system.
 2. Efficiency
The system must be fast enough to accommodate changes in the real time environment and cater adequately for user's need.
 3. Flexibility
The system must be expandable and flexible so that changing and new user requirements can be incorporated from time to time.
 4. User oriented
A good system must be that which is designed for the user. Thus, it must be user specific and acceptable to them. It must be able to satisfy the requirements of users adequately.
 5. A successful system should help users to develop confidence through reliability. This means that it should contain minimum cases of breakdown or abnormality and can always be used as and when need arises.
 6. High level integrity
A good system should safeguard users' confidentiality and the privacy and security of information under processing and in storage.
 7. Controllable
A system should be easily administered such that misuse of systems resources is minimised and data security improved. Thus it should contain a good framework of administrative personnel.
 8. Up to date
For a system to be successful, it should be in conformity with the latest and the most superior technology so that the risk of becoming obsolete are minimised.

QUESTION EIGHT

- a) Characteristics of information used in

1. Strategic planning

Strategic planning comprises of the topmost management in any organisation. Strategic management comprises decisions made by the chief executive the board of directors and very senior managers. They formulate long- term plans and assess how such plans are strategic to the long-term survival. They also assess the effects of external events on the company performance.

The strategic information required contain the following characteristics:

- i) Information used is normally old and relates to prior periods and as such it is not timely. For example, trend analysis.
- ii) The response time for information needs is slow since it has to be gathered from non-specific sources.
- iii) The frequency of information usage is not consistent and varies according to the current situation or needs.
- iv) The accuracy of information used is relatively low since most of data used is in form of estimates and predictions.
- v) Information is highly summarised and does not contain a lost of details thus it is highly aggregated.
- vi) Information used in strategic planning is costly and hard to access and so to obtain it requires extra effort.
- vii) Information is unstructured and so cannot be programmed since it is relatively uncertain.

2. Operational control

Operational control ensures that specific tasks are carried out efficiently and effectively. It involves the lowest level of management. Operational management consists of junior officers, clerks and supervisors. Their responsibilities include ensuring that transactions are collected from environment and recorded in suitable form and specific tasks are identified and organised for operation activities. It also ensures that adequate operation controls are put in place to control variances and abnormalities.

The characteristics of information used for operational control include: -

- i) Information is always timely and up to date
- ii) It is highly accurate as it involves facts and not estimates.
- iii) It is usually very detailed and contain a lot of information.
- iv) Information is mostly online and need not be searched for since It is ready for use upon demand.
- v) It is always easy to access since it is always up to date.
- vi) The response time to operational decisions based on operational information is instant and constant over time.

b) Features of deterministic stochastic and adaptive systems and examples of each type of system

1. Deterministic systems

These are systems in which various states or activities follow on from each other in a completely predictable way, for example, A will happen then B then C.

Features of a deterministic system are:

- i) It uses predictable input
- ii) The system reacts in a predictable way and as such, it is programmable.
- iii) The output is predictable and can be known in advance.

An example of a deterministic system is a computer program which acts in a programmed way to accept input data and process it according to laid down manner and eventually output in the manner specified.

2. Stochastic or probabilistic systems

These are systems in which although some states or activities can be predicted with certainty, others will occur with varying degrees of probability

Their features include:

- i) Controlling these systems involves quantification of publicity and risk
- ii) They are not usually predictable and cannot be programmed.

An example of a stochastic system is:

A company's credit control system. This credit control can analyse customer's payment schedule as 10% cash and 40% within 1 month of invoice and 50% within 2 months of invoice. However some of the customers may end up becoming bad debtors or extending their extending their credit periods.

3. Adaptive systems.

These are also called self-organising or cybernetic systems. They are systems which adapt and react to stimulus.

The features of this system are: -

- i) The way in which the system adapts is uncertain.
- ii) The same input or stimulus to the system will not always produce the same output or response.

An example of an adaptive system is a stock re-ordering system where the quantity of a stock item that is ordered from a supplier varies according to changes in the usage of the item. For instance, if the consumption of stock item S142 goes up by 20% per week, the reorder quantity of the item will be increased.

MODEL ANSWERS TO THE PAST CPA PAPER SET IN JUNE 2009
SYSTEMS THEORY MANAGEMENT AND INFORMATION SYSTEMS**QUESTION ONE**

- a) Major precautions to be taken into account in the process of sharing data and information.
1. Logical access control to the system and data files
This refers to controlling those who have access to terminal of a computer from gaining access to the data of software.

Logical access can be achieved through the use of passwords and software controls. They ensure that:
 - i) Data stored in the database files is not corrupted by unauthorised users or lost.
 - ii) Unauthorised access of data is restricted thus maintaining data confidentiality and integrity
 - iii) Data which is transmitted through the networks is not stolen during transmission by unauthorised persons. This can be achieved through data encryption.
 2. Physical access controls
These are controls which prevent unauthorised people from getting near the computer equipment or the storage media. They ensure that they system is protected against sabotage or access by unauthorised users. They can be achieved through:
 - i) Use of mechanical devices such as lock and keys to protect the system.
 - ii) Use of closed circuit cameras to identify unauthorised users.
 - iii) Use of electronic identification devices for users such as the card swipe systems.
 - iv) Location of the computer room to limit access to computer systems.
 3. Safe data transmission techniques
These are techniques which ensure that data being transmitted via a network cannot be accessed by unauthorised users. They include:
 - i) Data encryption: - This is a method of data transmission whereby data is transmitted in a coded or encrypted form and for the recipient to be able to read it must be decoded.
 - ii) Parity checks: - These are controls that check the transfer of data as it is being transferred from one system to another by use of a parity bit added to each byte.
 4. File identification checks
This precaution is especially important in the client/server architecture method of data processing. It ensures that correct files have been loaded for processing and that correct labels are sued. This enhances the reliability of data.
 5. Data transmission controls
These are controls on data which is being transmitted via a network link. They include:
 - i) Sampling of files and tracing them back to the original source documents.
 - ii) Establishing terminal check schedule for transmission.
 - iii) If transmission is batch oriented, the serial number of programs in each batch must be examined.
 - iv) Use of data encryption and protocols.
 6. Administrative controls
This include division of responsibilities, physical checks, environmental screening, sociological influences of information technology system, selection of personnel back up facilities etc.
- b) Relevance of the following to a Decision Support System (DSS)

1. Specialised packages

Specialised packages refers to special application programs which are fully documented for the performances of a particular problem. They can be statistical or quantitative for example, spreadsheet, accounting packages, graphics, design or clerical packages.

- These packages assist the user of a Decision Support System in analysing the different courses of action regarding a particular problem. They are particularly important during the analysis stage by the system so that various courses of action can be recommended.
- Specialised packages can also be used during sensitivity analysis during decision-making.
- These packages also help decision makers in analysing various decision models, for example, through variance analysis, linear programming and regression analysis system.

2. Query languages.

These are computer facilities, which allow a user of a database or Decision Support System to formulate ad hoc queries in order to obtain useful information from the database. The relevance of query languages to a Decision Support System is to help the users of the system to express what result is required without specifying how the result is to be obtained. In this case, the user is able to obtain a variety of recommendation and approaches to his queries.

3. Database Management Systems

This refers to a set of software or programs, which provide the interface between the logical and the physical data it manages the database. Its relevance to the Decision Support System in that it handles the interpretation and processing of the statements which are commanded in the query language. The Database Management System facilitates the retrieval of the required data from the data files in the manner which the user specifies and which it communicates in the manner appropriate for his decisions.

c) Application packages for administrative functions and how they can increase an organisation's efficiency.

Application programs are programs that are designed to help users to carry out specific activities.

1. Data management package

These are packages, which help the creation and maintenance of data for enquiry and reporting purposes. These packages allow for the creation of timely reports which are updated whenever such are required by management thus they can keep track of the organisation's events and thus improve efficiency.

2. Graphics packages

These are packages, which provide facilities that allow users to do various kinds of computer graphics and produce drawings or diagrams using such input devices as mice. These packages are important particularly to business organisations as a means of producing business charts and graphs so as to perform such activities as trend analysis and thus measure efficiency.

3. Spreadsheet packages

These are computer packages which deal with computations involving inter-related rows and columns of data. Spreadsheets can be used to perform calculations on the value displayed in the rows and columns. Spreadsheets are important to organisations in that: -

- i) They contain numerous cells thus can handle a lot of data.
- ii) They contain chart facilities such as pie charts and bar charts which can be used in information analysis.

Thus spreadsheets will obviously improve an organisation's efficiency by offering it the above advantages. Examples are MS Excel and Lotus 123.

4. Word processing packages

These are special purpose packages used for the production of documents such as letters, reports and contracts. They enable general purpose computers such as personal computers to be used for word processing.

These packages can increase the overall efficiency of the organisation in that they are quick and produce accurate documents free from spelling mistakes thus improve the accuracy of information.

QUESTION

TWO a)

i) Composition and roles of walkthrough teams

Systems walkthrough refers to a situation whereby the system developed is submitted to a team of a number of technicians including the ones who developed the system to go through it statement after the other checking for errors completeness and quality. The system is technically put through a desk checking exercise.

The walkthrough teams may be composed of:

1. The System Analyst: The analyst specifies the kind of a system to be developed and designs the program and the system as a whole so he must be included during the system testing.
2. The System Programmer(s): - He writes programs that have been specified by the analyst so he is included in the team so as to detect any errors.
3. Operation managers: - He is in charge of the data preparation section and other sections of computer centre and so he is aware of all data processing requirements.
4. User department managers: - They are responsible for all shop floor operations.
5. The IS project manager checks for documentation, conformity to plan and as such is aware of the new system specifications so he can be involved to determine whether such needs are achieved.

The roles of walkthrough teams are:

1. To detect and remove any errors in the system
2. To check for the completeness of the system as per specifications
3. To guarantee the system quality
4. To ensure that the system complies with user requirements
5. To ensure the system reliability so as to ensure that the system is free from any abnormality or vulnerability.

ii) Checklist of items to be examined during the walkthrough

1. Design specifications
2. User orientation
3. Reliability
4. System quality in terms of efficiency, flexibility and economy
5. System integrity in terms of security features
6. Maintainability of the system
7. Bugs or errors to ensure that the system is free from such.
8. Consistency with the system documentation.

- b) What is Graphical User Interface and why is there an increased design and implementation of such interfaces.

Graphical User Interface (GUI) refers to the interaction between end users and the computer based upon a graphical display. They are tools which are designed to enhance personal computing work thus mostly fitted on workstations or personal computers with graphics adapters able to support high resolution graphics (GUIs) are inherently visual and usually come with graphics software packages such as painting and drawing packages.

The reasons why there is increased design and implementation of such interfaces are:

1. To enhance end user computing whereby users solve their own problems without seeking assistance from experts.
2. To enhance user friendliness of the system through easy to learn interfaces.
3. To eliminate the need for technical training on use of the system.
4. To reduce the amount of effort and information required of the user to get the system complete required tasks.
5. The system should be able to adjust to different levels of expertise between users as users grow in competence.
6. The user should be made to feel in control of what is going on.
7. To make it easy for users to start using a system.
8. The system should behave in a logical and consistent manner enabling the user to reason about what is going on and apply what has been learned.

QUESTION THREE

- a) Electronic Data Interchange (EDI)

This refers to a form of computer to computer data interchange through agreed standards by all parties. The concept of one computer communicating to another can be faced with major difficulties such as: -

- i) Each business organisation wants to produce documents to its own individual requirements and structure.
- ii) Different makes of computers cannot easily communicate to each other due to compatibility problems.
- iii) Businesses may be working at different time schedules especially when engaged in international trade.

Thus, to ensure electronic communication is possible, agreed formats for these electronic documents recognisable by all parties to the transactions are agreed upon.

The advantages of EDI are:

1. If an organisation is decentralised, EDI can expedite internal billing
2. If an organisation's paperwork is intricate and complex, EDI can speed it up.

The disadvantages are:

1. Joining EDI network is quite expensive
2. There may be problems with deciding which categories of information are to be sent or received.
3. Problem in adapting internal systems so that they match up with EDI translation software.

- b) Client server computing

Client-server computing refers to a way of describing the relationship between the devices in a network whereby the tasks that need to be carried out are distributed among various machines on the network.

A client is a machine which requests a service. For example, a PC running a word processing application which the user wishes to print out.

A server is a machine which is dedicated to providing a particular function or service requested by a client. They include file server, print server, and fax servers.

A client server system allows computer power to be distributed where it is most needed. This approach has the following advantages:

- i) It reduces network communication costs
- ii) It allows the central computer to be used for administrative tasks such as network management.
- iii) The technological flexibility of this type of system allows the use of sophisticated applications such as multimedia.

c) System specifications

This refers to a complete documentation of the whole system which is properly maintained or updated as parts of the system are changed or added to. Problems arise in computer installations because of inadequate systems and program documentation and controls must be set up to ensure that updating procedures are always carried out.

Specifications involve a complete description of a program usually including flow charts, program listings, test data and expected results. System specifications are drawn up by the system analyst. There should be program specifications and hardware specifications for every individual program or hardware in the system.

d) Electronic point of sale system

This is a terminal unit or a system capable of selling, processing and receiving sales and stock particulars by selling transactions. They are mostly used in retail outlets as terminals connecting the cashier to the computer database containing the stock and sales data. It comprises of 3 units namely:

- Bar code scanner
- Cash register keyboard
- Cash register visual screen panel or VDU

When a customer presents an item to the cashier, the cashier either enters the keyboard numbers through the keyboard or uses the scanner to read the bar code. The information is then sent to computer memory, which interprets the information and retrieves the data from the magnitude containing the stock and sale. The system calculate the total amount of purchases and sales before reconciling the stock. It also gives out the itemised receipt and change to customer.

The advantages of this system include: -

1. It is very fast and convenient to both the cashier and customer.
2. It gives more accurate and reliable services
3. It reduces the need for oriental personnel
4. It provides automatic control of stock and sales data.

However the system suffers the following drawbacks

1. It is vulnerable to mechanical and power failure.
2. It is very expensive and requires large organisation with substance data processing requirements.
3. Updating or alteration of stock or sales data involves a lot of work and cost.

QUESTION FOUR

Guidelines required for the development of new information systems

1. Economy
A good system must be economical or cost effective meaning that tangible and intangible benefits derived should outweigh all the costs involved in the development.
2. Efficiency
It will be in the interest of the user to develop a system which is fast enough so as to accommodate changes in the real time environment
3. Flexibility
A good system must be expandable or flexible so that user requirement can be incorporated from time to time.
4. User oriented
The system is designed for the user but not user for the system thus it must be user specific so that it is acceptable to them.
5. Reliability
A good system should help users develop confidence through reliability this means cases of breakdown or abnormality should be reduced.
6. High level integrity
A good system should safeguard the user confidentiality or the privacy of information under processing.

Meaning of the following terms:

i) Unit testing and system testing

Unit testing refers to trials made to individual components of hardware or software. For example, when a program is developed, in-house unit test for each program in the system is conducted to test the interface between individual programs in the system.

System testing refers to thorough test performed on the system as a whole. It involves tests or trials on the system intended to sort out major bugs or problems using dummy or invented data so as to test all conditions. For example, dummy test data records should be input which is designated to test all the data validation routines and master file update error reports in the system.

ii) Preventive and perfective maintenance

Preventive maintenance refers to maintenance carried out to take account of anticipated changes in the processing environment. Changes in user operating procedures occur from time to time and software may require amendments to reflect this so as to prevent the system from failing or becoming obsolete.

Perfective maintenance is carried out in order to perfect the software or to improve software so that the processing inefficiencies are eliminated and performance is enhanced. It consists of making enhancements requested by users to improve or extend the facilities available. For example, amendments to make software more user friendly.

iii) Co processing and parallel processing.

Co-processing refers to a situations whereby two central processing Units (CPUs) execute one single program at a go. A program may be run by two processors at a single time in a situation whereby the data being processed is complex and bulky.

Parallel processing refers to a situation where by a single system handles multiple programs at a time. The CPU attention is switched among the programs on a timed basis controlled by the operating system thus it appears as if each program is having uninterrupted access to the CPU.

iv) Logical and physical design of a system.

Contributions that an information resource centre might make towards end user computing:

An information resource centre is a small unit of staff with a good technical awareness of computer systems whose task is to provide a support function to computer users within the organisation. End user computing refers to direct hands-on of computers by users and not indirect use through systems professionals or the data processing staff. End users include executives, managers, professional staff, secretaries, office workers and so on.

The contribution made by information resource centres towards end user computing include:

1. Encouraging users who wish to develop their own applications and providing them with technical assistance.
2. Encouraging users to conform to any hardware or software or programming standards that the organisation might use. For example, to make sure that all microcomputers purchased by the organisation are compatible and so could be moved around from department to department if necessary.
3. Ensuring that applications developed are replicated by others in the organisation where this will be of benefit to the organisation.
4. Advising end users on ways of getting better use out of their existing systems. Computer users might be unaware of what their system is capable of doing or how to set about making use of the system capabilities.
5. **The resource centres should be readily available to end users and the centre's staff should try to keep a high profile with end user departments. This enhances adequate support. This can be achieved through the use of a telephone —hot line or a drop-in advice centre.**

QUESTION FIVE

- a) Major health related problems that may result from intensive computer use and products available to improve the working conditions of personnel using computers.

1. Loss of eye sight due to eye strain
Intensive computer use could lead to strained eyes due to the light from the visual display unit. This light could eventually lead to loss of sight by users.
2. trained back due to inappropriate posture while using a computer. Intensive computer use especially long sessions of computer use in an uncomfortable situation could lead to **damage to the user's backbone leading to bad posture.**
3. Brain damage
Brain damage can result from extensive use of computer systems especially where those systems contain remote connections meaning that there is radiation which could spoil the user body systems.

Products which are available to improve the working conditions of computer users include.

1. Tinted screens able to protect users from direct light from the visual display unit.
2. **Specially designed furniture which are designed to improve user's comfort when computing.**
3. Anti-radiation devices using to protect users from being affected by radiation.

- b) Basic strategies that an organisation can employ to obtain competitive advantage and the role of information technology in each case.

Strategies refer to long term objectives and goals and the ways by which these will be achieved. These include:

1. Information strategy
The proliferation of computers in commercial applications has put commercial organisations on a competitive advantage.

A strategy for information systems can be justified based on the following reasons:

- i) Information technology is critical to the success of many organisations as it involves the collection of timely and accurate information for decision-making.

- ii) Information technology can be used as a commercial strategy in the battle for competitive advantage. It can be used to improve productivity and performance through such facilities as the computer aided design (CAD) and computer integrated manufacturing.
- iii) Information technology for information strategies is required in the economic context and can produce dramatic changes in individual businesses and whole industries especially where there are other major forces for change.
- iv) It involves many stakeholders namely consumers and not just management within the organisation's consumers test IT based products through tele-shopping thus a strategically placed business will obviously provide a competitive advantage.

Information strategies can cover 3 areas:

- i) Information system strategy – This refers to the long term directional plan which is business led, demand oriented and concerned to exploit information technology to support business strategies or create new strategic options.
- ii) Information technology strategy – this is a product of information systems strategy that deal with technologies. It provides a framework for the analysis and design of technological infrastructure of an organisation.
- iii) Information management strategy: - this refers to the basic approach an organisation has to the management of information systems such as planning, organising controlling of system development methodologies.

2. Product strategies.

This refers to strategies employed by businesses to ensure that their products remain the market leaders in terms of quality and productivity. Product strategies are used to ensure that the producer of a particular product provides the best required satisfaction in his products so that consumers are convinced that the products they are consuming are superior than others produced by other producers.

Information technology can be used by the producer who is pursuing a product strategy, to improve productivity, performance and quality. This can be achieved through such techniques as: -

- Computer Aided design (CAD) which is used to design better products and make them appear more superior.
- Computer integrated manufacturing which can be used to automate the manufacturing system

3. Market strategy

These are strategies used by business organisations to ensure that they remain or attain the status of market leaders within their markets. Marketing is the management process that identifies, anticipates, and supplies customer requirements efficiently and profitably.

The key to achieving organisational goals consists of being more effective than competitors in integrating marketing activities towards determining and satisfying the needs and wants of target markets.

Information technology can be used as a market strategic weapon to develop new businesses. For example, the creation of an electronic market place where subscribers can trade via terminals. Information technology has provided such facilities as the internet where buyers can access seller's web and place orders via the internet. Also, other technologies such as Electronic Data interchange (EDI) and Electronic commerce (e-commerce) are all market strategies.

- c) Distinction between online and offline transactions.

- Online transactions refers to transactions which are initiated directly by the system and immediately processed by the system and at the same time output immediately they are processed.
- Offline transactions refers to transactions which are initiated outside the system. They are not directly processed by the central processing unit. Offline equipment such as key-punch machines for punching cards have no direct hook-up with then central processing unit.

QUESTION SIX

- a) Reasons that may lead to resistance to the introduction of INFORMATION COMMUNICATION TECHNOLOGY and how an organisation can overcome it.

User resistance refers to the reluctance of some people to move to the new system or to give information or accept new ways of doing things. It arises due to the following reason:

- 1) Fear of unknown consequences of adopting new ways by users.
- 2) Fear of loss of status or power by users especially senior managers who feel that their duties will be overtaken by use of computers.
- 3) Fear of loss of jobs or job security where new ways automate clerical and manual procedures.
- 4) Attention to interpersonal relationships whereby human beings are required to interact with the system instead of other people.
- 5) Fear of acquiring new training based on technology or technophobia.
- 6) Changes in job content since most procedures will be automated.
- 7) Mode in which the change from old procedures to new procedures is implemented. Poor changeover methods can lead even to system failure.
- 8) Assigning change responsibility to somebody within the organisation who possesses the organisation's power to legitimise change.

- b) Factors which bring about change in an organisation

Change refers to the alteration of relationship and roles people play in the organisation. It is any shift in status quo of an organisation to enable it to be better aligned with its environment.

Factors which bring about change in an organisation are:

1. Change in technology which would push the organisation into the need to remain technologically advanced thus competitive edge.
2. Changes in the market situation such as new entrants into the market which could bring about new competitors.
3. Social and political changes which could result from change in tastes of consumers or change in government legislation affecting the business.
4. Changes in managerial personnel whereby new managers can bring about new ideas, policies and systems.
5. Deficiency or inadequacy of the existing systems leading to the need for new improved methods.
6. Employees desire to share in decision making thus need to accommodate their ideas.
7. Rapid growth of small companies thus the need to extend the capacity.
8. If the company is about to join ranks of very large companies, this will necessitate change so as to harmonise operations with those of the acquirer.
9. Demands by employees for higher pays, better job satisfaction etc.

QUESTION SEVEN

- a) Benefits and dangers of the increasing use of information technologies to the accounting functions in an organisation.

Benefits

1. Information technology to the accounting functions has brought about the simplification of accounting duties since accounting programs are more easy to learn and use as opposed to manual procedures.
2. Single packages used in information processing in the accounting function are thoroughly tested before being released then it follows that more quality and error free information is output in the system thus boosting the reliability of financial information.
3. Information technology facilitates the timely output of routine reports such as annual information. This improves the organisation's efficiency and accounting information.
4. Most packages used in the accounting function contain the audit trail of the accounting entries made on the organisation during the year. This boosts the authenticity and reliability of information as well as improving the internal and external check system.
5. Information technology has resulted to less expensive processors such that processing of accounting information will be widely available for many tasks at an acceptable cost, for example, accounting packages could provide both financial information and information for audit purposes.
6. Increased information technology has also resulted in increased end user computing in the accounting function such that even less qualified accountants can be able to perform more complex tasks like preparation of final statements.
7. Accounting functions may also be equipped with expert systems to provide the organisation with complex accounting information such as financial management and auditing.
8. Extensive use of information technology has resulted to the development of more productive and easier for users to access and use especially vital accounting information.

Dangers

1. Accountants may not be able to cope with complex technology thus resulting to reduced efficiency in the accounting functions.
2. Information systems development staff may not communicate well with each other so that user requirements are not properly met thus information
3. Wider access to data as a result of widespread information technology increases the risk of threats to security particularly where data is transmitted between sites.
4. Information technology may result to a tendency to produce information for the sake by the accounting function rather than because it is required.
5. Technology is still at its infancy and changes in the needs in the accounting function could lead to extra costs when upgrading occurs.

b) Major factors influencing the structure of an information system.

1. Organisations resources and activities: - An organisation can be likened to a system operating in a given environment thus its information system will be structured in accordance with its environment.
2. Size of the organisation: - The size of an organisation will determine the structure of its information system, for example, very complex organisations will have complex systems while small organisations may also have only a stand alone computer system.
3. Geographical dispersion of the organisation: - The organisations with branches all over are likely to have distributed data processing systems.
4. The management structure of an organisation: - This is likely to affect the flow of information especially the direction in which information flows.

QUESTION EIGHT

- a) Factors that guide a systems designer when designing the user interface for a particular application..

User interface refers to the interaction between users and the system. The primary purpose of user interface is to enable communication to and fro between the user and the computer.

The most important feature of computer user interface is that it should be user friendly and as the name suggest user friendly interface is one that end user finds helpful, easy to learn and easy to use. In this case then, the system designer should consider the following factors in designing user interface.

- i) It should be relatively easy for the user to start using the application.
 - ii) As far as possible, the application should be self-contained so that the user is not forced into accessing manuals or dealing with things that should be kept outside the system.
 - iii) The amount of effort and information required of the user to get the system to complete required tasks should be kept to a minimum.
 - iv) The user should be insulated from unexpected or spurious system actions. This includes protection against being the cause of a system failure and implies that the system should also be robust and reliable.
 - v) The system should be able to feel in control of what is going on in the application.
 - vi) The system should behave in a logical and consistent manner thus enabling users to reason about what is going on and apply what has been learned.
 - vii) The application should make it easier to access secondary documents.
- b) Factors influencing re-centralisation of information systems.
- Re-centralisation or upsizing refers to the process of consolidating distributed data processing centres into one central processing centre.
1. Systems management is considerably more complex than for centralised systems. For example systems operate across the different platforms are few and far apart.
 2. Distributed systems involve the use of networks. This therefore brings about the problem of network management due to lack of appropriate software.
 3. Systems administration is also made easier by re-centralisation thus the organisation can adequately provide such. Vital features as system security, database administration, backup and restore, and software distribution.
 4. Online maintaining of systems, fault detection tracking and resolution is made easier by re-centralisation.
 5. Data and systems security is improved since data is held centrally and is not vulnerable to degradation or other risks associated with computer networking.
 6. Re-centralisation helps to reduce communication costs for remote terminals. For example, there is no need for such devices as modems and internet access costs for inter-networked systems.

MODEL ANSWERS TO THE CPA PAPER SET IN DECEMBER 2009
SYSTEMS THEORY AND MANAGEMENT OF INFORMATION SYSTEMS

QUESTION ONE

- a) Procedure of acquiring hardware and software:

Hardware refers to all physical or tangible devices involved in the process of data processing. These may be the mechanical, electric mechanical or electronic devices for input, output, processing and storage of data.

Software refers to all programs, instruction and control devices which influence or facilitate the data processing work. They include application packages operating instructions or programming languages. For a computer user to acquire hardware and software, the following procedure needs to be followed:

1. Feasibility study

The aim of a feasibility study is to make informed decisions whether or not resources should be committed to development or acquisition of the required hardware and software facilities. It must reach some conclusions about the hardware and software requirements for the system. Requirements can only be established from an investigation of the current system. The most important questions or matters to be resolved during a feasibility study are:

- i) What equipment is needed to handle the software and what software is needed to handle the equipment
- ii) Should the equipment and software be bought, rented or leased.

2. Vendor hardware and software proposals

The stage involves the selection of the suppliers of the hardware and software required. In making the decision of the most appropriate supplier the following points may be borne in mind.

- i) How well established is the supplier's company. A firm with a reasonably long history of trading would generally be the most appropriate supplier.
- ii) Do the supplier's staff appear to have a good knowledge of the application to which the software relates? For example, a firm that sells accounts software packages ought to have staff who know something about accounts as well as computers.
- iii) Can the supplier introduce the customer to any other users of the hardware or software who would be willing to demonstrate it and recommend it

Vendors proposals are then obtained through an invitation to tender to a range of suppliers or simply by shopping around. An invitation to tender sets out the specifications for the required system explaining how it is to be used and setting out the time scale for implementation. The target price will also be stated. Suppliers are required to submit tenders and if they require further information before submitting their tenders, they will be able to contact the organisation to obtain further details.

Once vendor proposals are obtained they are evaluated using such procedures as benchmarking as simulation tests. The customer needs to be aware of other factors such as the cost of the equipment, availability of utility software and software tools supplied with the hardware; warranty and maintenance contract, software support by the supplier, training offered to the customer's staff by the supplier and tailor made amendments to software packages.

3. Delivery and installation of equipment

The supplier after delivering the equipment to the customer may agree to install them for the customer. If he does not, the customer may have to install the hardware himself. In this case, he should carefully follow the manufacturer's instruction manual provided.

4. Testing

The system installed should then be thoroughly tested before its use starts otherwise there is a danger that the new system will run with faults that might prove costly.

b) Change-over strategies

The four major change-over strategies are:

- i) Direct change-over
- ii) Parallel running
- iii) Pilot tests
- iv) Phased or staged implementation.

The following systems should be implemented using such changeover strategies as recommended below:

i) Electronic point of sale systems for chains of supermarkets countrywide.

For this system, I would recommend a phased or staged implementation. This is a method best suited to projects where distinct parts of the system are geographically dispersed. For example, the management may start by first implementing the system in branches which are located in the capital cities followed by those in major towns. This will guarantee a smooth change over without the need to recruit additional trained staff all at once. Existing staff are therefore given ample time to learn the new procedure well in hand by way of familiarisation courses.

ii) Secondary school admission system

In this system, I would recommend the direct change over. This is a changeover method in which the old system is completely replaced by the new system in one move. This method may be unavoidable in the case of a secondary school admission system because the old and the new system may be substantially different and parallel running is unrealistic. It is a cheap method and most appropriate for this situation, which mainly happens once in a year.

iii) Airtime seat reservation system

I would recommend the parallel running form of changeover. In this case, the old and the new system of seat reservation will be run in parallel for a period of time thus enabling cross checking to be made. In this case, the effectiveness of the new system will be known and its reliability made apparent.

This method is safer should there be problems with the new system as such it is better than the direct change over which might end up confusing the travellers.

c) Features of information needed for strategic planning in an organisation:

Strategic planning involves formulation of long-term objectives and goals and the ways by which these will be achieved. It concerns decisions which have a major impact on the long-term future of an organisation. Strategic planning in the context of information technology - must contain vital information features on how such a strategy can be formulated.

These include:

- a) This organisations overall business needs and information technology needs as a consequence.
- b) The organisation's current use of information technology
- c) The potential opportunities that information technology can bring.

QUESTION TWO

- a) Grounds that disapprove the statement that everything that an expert system can do a decision support system can do.

An expert system is a computer-based system that solves problems requiring a lot of human professional knowledge. They act as expert consultants to the users.

A decision support system (DSS) refers to a set of programs and hardware that allows users to interact with so as to help them make decisions.

It is quite untrue to state that everything that an expert system can do a decision support system can do due to the following grounds:

1. Decision support systems help users in decision making. In this case, they never place the judgement or make the decision for the user. This is not the case for expert systems because expert system makes the decision for the user when the user presents it with the problem.
 2. The process of decision making in decision support system is user controlled as opposed to that of an expert system which is controlled by the system.
 3. Expert systems can only handle one given area for example in legal expertise. Decision support systems can sometimes be general or ad hoc systems, which can handle a wide variety of managerial decision problems.
 4. Decision support systems are only appropriate when personal or professional judgement are required instead of programmable decisions. Expert systems are appropriate for decisions, which do not require a personal judgement as decisions are already programmed.
- b) Seller maintenance contract and specifications required by the user in a seller maintenance contract.

A seller maintenance contract refers to an agreement between the vendor of software and the buyer to offer any technical assistance in future for items supplied by the vendor in case they fail to perform as specified. Such technical assistance may include specialist assistance in case the buyer runs into difficulty with the program or software in future.

The customer will need to sign a maintenance contract after clearly understanding the terms of the contract and how much it cost him. Such terms include such specifications as:

1. How quickly the supplier promises to have a repair maintenance engineer out to visit the customer in case he runs into difficulty. This will help the customer to be assured of a minimum idle time or loss of time in case the software breaks down.
 2. If the whole system is to be put on hold pending correction of faulty software, the supplier might promise to provide backup or a standby system to stand in for the one being corrected.
 3. The customer will need to be aware of the cost effects on the contract in that the costs should be lower than the ordinary market costs of maintenance.
 4. The customer should avoid clauses that could lead him in being locked in the vendor such that all his requirements must have to be sourced from the supplier.
- c) Difference between a source code and object code

A source code is an instruction which is written using memory aids or mnemonics. Memory aids or mnemonics are instructions written in the programming language which can only be interpreted directly by the programmer.

An object code is an instruction which has been translated into a machine code or machine readable form by use of a specialised translation program called compilers, which translate a source code to a machine code before it can be used by a computer.

QUESTION THREE

- a) Main criteria which should be met by a local area network design:

A local area network refers to a transmission process involving computer terminals and peripherals which are physically linked within a room(s) in a building or one site.

A local area network design should meet the following criteria:

1. It should enhance the sharing of experience resources. For example, management at various levels should be able to share information and as such, design making should be fast and effective. It should also allow program sharing.
2. It should help in faster data processing and retrieval. This means that the design should facilitate faster access to data from the file servers so as to help in the faster transaction processing.
3. The network should also help in reducing data processing costs. Costs may be saved due to minimised job queue.
4. It should allow sharing of work loads in that the various terminals can be used to process data and transmit it through the network to the required terminal.
5. It should help in decentralisation of data processing activities. Activities can be easily performed in the terminals and transmitted through the network to the head office or to the main data office.
6. The network should enable the communication of one system to another so as to detect multi-accessing and curtail unauthorised access.

- b) Reasons for adopting a database as a basis for an information system.

A database is a collection of structured data. It is a non-redundant collection of logically related files organised in a manner that satisfies the needs of an organisation where typical needs of an organisation are for carrying out administrative duties.

A database: -

- Fulfills organisations information needs
- Is designed in such a way that it is only accessible to authorised persons.
- It is organised in such a way to enable access and updating of records to be made by different people in different ways without changing its design.

I would adopt a database as a basis of an information system due to the following reasons:

1. A database avoids the problem of data duplication or redundancy by allowing a single data element to be used in a number of applications. Unlike the traditional approaches whereby data files are created when need arises resulting to a lot of duplication and wastage of storage space.
2. With database as a basis of information system, it is easier to update files as and when need arises. This process may be very tiresome and time consuming in case of traditional file processing approaches.
3. Database enhances data integrity as only those who are authorised to make changes in the files can gain access to the system.
4. Data is independent of the programs which use it. Thus database remove data and program dependence.
5. Database form of information system ensures consistency in an organisation's use of data since all data is integrated and homogeneous in nature.
6. It brings about greater formality over security control especially over access to the system.

- c) Categories of computer related crime

Computer related crime refers to the use of computer and software for illegal purposes. They include:

- 1) Trapdoors

This is an undocumented entry point into a computer system. It is not founding design specifications but may be put in by software developers to enable them to bypass access controls while working on a new piece of software. In this case, a secret special response can be entered and to bypass controls and access confidential information.

2) Logic bombs

This refers to a piece of code triggered by certain events. For example a program will behave normally until a certain event occurs. For example, when disk utilisation reaches a certain percentage and thus activates the logic bomb which then maximises damage.

3) Time bombs

These are similar to logic bombs except that they are triggered at a certain date.

4) Electronic eavesdropping

This refers to tapping without authorisation into communication line say a network cable over which computer data and messages are transmitted.

5) Trojans

This is a program installed in a computer that performs one function while secretly carrying out another. For example, a program could be running a computer game while simultaneously destroying a data file or another program. Trojans may be used to cover illegal activities or facilitate the destruction of certain vital information.

QUESTION FOUR

a) Programmed and non-programmed decisions

- i) Programmed decisions refers to those decisions on which the quality standards and guidelines are already established. These decisions are mainly routine in nature and can be made by reference to previously established standards. They are usually made by the lower level management, say a junior officer or a clerk. Examples of such decisions include; credit granting decisions to a customer based on order value credit worthiness or credit limit.

Non programmed or unstructured decisions are those decisions that deal with problems or applications that cannot be clearly defined or identified. They are characterised with uncertainty and mainly concern the future operation containing variables or data where impact cannot be estimated. Such decisions thus require high and qualified managers who are able to make correct judgement based on environment understanding as there is no precedence or reference to guide the decision making. Unstructured decisions require managers to use their intuition or intelligence and skills to make decisions.

ii) Type of decision to which it may apply:

- Computer program – programmed or structured decisions
- Stock ordering – programmed or structured decisions
- Judgement – unprogrammed or unstructured decisions
- Regulation – programmed or structured decisions

b) Effects of the internet on the following sectors

The Internet is the name given to the technology that allows any computer with telecommunications link to exchange information with other similarly equipped computers. The following are the effects of Internet on the following sectors of the society: -

i) **Education**

1. The internet is emerging as a major educational tool. For example, many magazines, newspaper and journals are now available on the web thus availing users of internet a lot of information.
2. The internet also facilitates education by availing information cheaply to users through the web pages. Users are not required to pay anything to access those pieces of information

3. It also facilitates exchange of information and ideas between various persons thus facilitating sharing of ideas.

ii) **Service provision industry**

1. The internet reduces the need for paperwork and all clerical work that accompanies it in the service industry. For example, the printing postage, processing and handling mail costs related to the service are not necessary. For example, a traveller does not require to send mails or travel to a booking office to have a reservation, all he requires is to send an email.
2. The internet reduces the overall costs incurred by players in the service provision industry in that cost of stationery and staff needed to take orders over the telephone. There are also reduced telecommunication costs and transaction costs become automated. This makes business more efficient and economical thus improved profitability.
3. Internets can transform local industries into global players. For example, services consumers will be able to know of the existence of a company and the services it offers by accessing the web.
4. It improves customer relationship as it brings closer the service providers and their customers. Customers can access computers of their suppliers thus it helps them to do their job better. This leads to increased business and thus profitability.
5. Internetworking reduces transaction time thus saving variable time in the end customer get improved services with efficiency.
6. The ease of use of online markets is characterised by the fact that systems are so easy to use compared with placing manual service provision requests. Orders can be entered at any time in 24 hours a day with confirmations arriving almost immediately. Customers can check their account status at any time and do not have to wait for monthly statements. This positively affects the operations of the service provision business.
For example an industrialist may need to access his machine technician's web and call upon him in case of machine failure.

QUESTION FIVE

a) Specify features to be included with the design of the data base system

1. Strict operating procedures
The database through the database management system should have in built procedures which allows only the authorised persons to access the system or to make modifications such as updating the data.
2. Back-up procedures
The design of a database system should include backup procedures to ensure that data is not lost in case of malfunction or accidental loss of data.
3. Protection against remote access
Data contained in the system should be protected against remote access through the use of passwords and data encryption.
4. Controlled access to the system
Physical security measures should be put in place to limit physical access to the system by unauthorised users.
5. Database administration
A database system should have an administrator who is responsible for its administration. He performs such functions as maintaining the database the data dictionary and helping users overcome the problems that they encounter.

b) Cost/benefit and its relevance

Cost benefit analysis refers to the economic feasibility a evaluation of a system to determine whether it is a good investment or not. It seeks to establish whether the benefits that are to be reaped from the system outweigh the costs incurred to implement it.

The relevance of cost benefit analysis to the system analyst during system development arise due to the fact that: -

1. The analyst carries out a methodological study at the current system so that a system that suits user requirements and which is feasible is obtained. Thus, cost benefit analysis is inevitable.
2. The system analyst specifies the input output and storage files as well as the processing hardware and software. Thus, he must be conscious about the costs of such facilities and the benefits to be accrued from each of them.
3. The analyst is also involved in the post implementation review stage and as such he is able to know and appreciate whether the system is working in conformity with desired costs and benefits.

c) Features which should be inherent in an operating system

An operating system is an organised collection of a suite of programs which controls and supervises computer system hardware and provides services to programmers and users of a computer system.

Operating systems should have such features as:

1. It should be able to perform control oriented tasks such as multiprogramming, multi-processing and batch processing.
2. It should allow for time-sharing such that multiple users can access a single computer system at one time.
3. It should allow for concurrent execution of programs so as to enhance speedy processing of data.
4. Operating systems should handle interruptions caused by program abnormalities or machine failure and be able to report this to the user.
5. System security is inherent to any operating system as all security routine checks are controlled by the operating system.
6. Ease of use or need for basic training.
7. Portability of the program from one system to another.
8. Speed and productivity of the software.
9. Its cost of maintenance.
10. Popularity of goodwill of the software amongst users.
11. Ability to be used in networks.

QUESTION SIX

a) Aspects of information system development life cycle for which CASE and prototyping tools and techniques are available and their application in each case.

Computer Aided Software Engineering (CASE) tools refers to a set of programs used to automate thus improve system development by enabling analysts and designers to integrate and analyse documentation of several analysts and programmers who may be working on different phases of the system. They ensure accuracy, consistency and speed.

A prototype refers to a model of all or part of a system built to show uses how a system will appear. The process of creating a prototype is called prototyping and helps in capturing users' requirements faster at a lower cost.

The following aspects of system development life cycle can be performed using the above tools and methodologies:

- i) Capturing user requirements during the design stage. This can be done using a prototype to determine actual user needs.
- ii) Creation of design diagrams during the procedure design stage. CASE tools called analyst work benches can be used to produce flow charts and data flow diagrams in the system design stage.
- iii) Checking adherence to design standards can be achieved through the use of CASE tools such as analysts work benches programs.

- iv) They can be used in calculating the time frames or duration to system completion. This can be achieved using programs such as integrated program system environment to carry out such the Critical Path Analysis (CPA) or the Program Evaluation Review Techniques (PERT) during initial development stage.
 - v) The tools can also support separate or individual phases of the system development cycle. This can be achieved through the use of stand-alone CASE tools.
 - vi) Automation of some of the processes of system development involved in turning system specifications into a working program. Such include generation of codes and diagnostic aids. This can be achieved by use of CASE tools such as the programmers work benches.
- a) Role of database administrator
- ☐ To maintain the database. The database administrator is responsible for making additions deleting information and ensuring that there is no duplication of data.
 - ☐ Maintaining the data dictionary. A data dictionary is an index of data held in a database which can be used in the maintenance and access of the database. It contains a pool of information concerning a database.
 - ☐ Helping users to overcome the problems that they may encounter when using the database.
 - ☐ Resolving conflicts between users and the technical people.
 - ☐ Overseeing the database security.
 - ☐ Evaluating the Database Management System (DBMS) performance so as to determine whether it meets the organisation's needs.
 - ☐ Enhancing backing up of data and making sure that data recovery is in place.
 - ☐ Ensuring compliance with the rules and regulations, for example, statutory legislation i.e. Data Protection Act.

QUESTION SEVEN

- a) Problems arising as a result of widespread end user computing and how they might be avoided.

Distributed systems refers to several interconnected processors situated in separate localities where each processor has its own local peripherals for example, disc storage and terminals. Each processor acts automatically but at other times can co-operate in handling a common problem. Distributed processing gives end users control and responsibility for their own data.

End user computing refers to direct hands on use of computers by users – not indirect use through systems professionals or data processing staff. End users include executive managers, professional staff, secretaries, office workers, etc.

Problems arising as a result of widespread end user computing include:

- 1) Lack of user education about personal computing.
- 2) User requests for assistance that overwhelm the IT department.
- 3) Lack of users knowledge or concern about microcomputer control measures such as fire back up.
- 4) Lack of integration in the micro-mainframe data exchange and control.
- 5) Poor maintainability of user developed systems.
- 6) Mismatching of user problems and computer alternatives for system development.
- 7) Lack of centralised management of corporate data resources that support personal computing.
- 8) Lack of user concern about equipment security.
- 9) Lack of user friendly mainframe software to compete with micro computers.

However, these problems can be overcome through: -

- 1) Institution of physical and logical access controls to systems such that only legitimate users use the systems.

- 2) Proper training of staff or users.
- 3) Proper system administration especially the IT department.
- 4) Providing support functions such as the information resource centres user groups.
- 5) Proper system documentation.

b) Three main sources of applications software and their appropriateness.

Applications software consists of programs which carry out a specific activity task for the user.

The various sources of application programs are:

1. Application packages

These are also known as off the shelf programs and are ready made programs written by a manufacturer to perform a particular task which is common to many potential users and could be adopted by all of them. Packages may contain add-on facilities to allow for minor alterations required to suit certain businesses. Packages are normally appropriate in that:

- i) They come with an assurance of system compatibility.
- ii) They require minimum start up time and training cost during implementation.
- iii) They can be tailored to meet certain unique needs.
- iv) They can be sold to other users since they can use standard

2. Do-it-yourself programs

This application programs designed and developed by users themselves. They are also known as in-house programs and are normally not very complex. These programs are appropriate because: -

- i) They involve only a low cost since no specialists need to be hired.
- ii) They are fast to develop and complete.
- iii) They can be revised when need arises.
- iv) They are a morale booster to electronic data processing staff.
- v) They are naturally customised to the system being developed.

3. Specialist built or customised programs

These are application programs developed by software experts normally information analysts with experience in system analysis who are contracted by the organisation to develop an application program for its use. They are ideal where the program required is complex. These programs are appropriate in that:

- i) They can be revised by the developer to suit changing demands.
- ii) They are easy to learn and use.
- iii) They are free from errors since they are thoroughly tested before being released as opposed to do-it-yourself programs.

c) Fourth generation languages and their application during system development.

Fourth generation languages (4GLs) describes a set of computer based tools or facilities which assist program users in the design and preparation of an application. They help the user to develop their own application more readily and cheaply without consulting analysts and programmers.

Fourth generation languages can help users during an information system development in the following ways: -

1. 4GLs are non-procedural and as such, program functions are not produced by the user but the 4GL itself. Users simply request for the data processing result or output instead of providing the detail physical and logic used. This helps to come up with applications more quickly and cheaply with minimal errors. This aspect is critical in the case of program development and results to increased programmers productivity.
2. 4GLs are problem oriented in that programs are designed to solve particular problems using English like structures. Being problem oriented makes the language more

productive to specific applications. This is vital in the case of information system development since it ensures quality and productivity of applications developed.

3. 4GLs enhance user creativity and productivity. Unlike procedural languages, 4GL tends to promote user computing spirit and skills. User acceptance acknowledgement and understanding will enhance reduction of technophobia: thus more quality and reliable systems.
4. System maintenance and flexibility is enhanced. 4GLs facilitate a continuous process of application development. The rigid requirement and the technical requirement involved in system development life cycle is reduced. Change in user requirements can always be incorporated in the systems design from time to time.
5. 4GLs enhance end user computing and so limiting the use of IT staff.
6. They help the organisation to tap over creativity thus new information systems will be of higher quality.
7. 4GLs help in the diffusion of information technology throughout the organisation.

QUESTION EIGHT

a) Industries and business organisations using computer networking

1. Banking Industry
Networking in the banking industries is used to provide such services as CHAPS and BACS.
2. Retailing industry
Chain stores and supermarkets use computer networking to facilitate branch accounting by linking branches with the head office.
3. Service provision industries
These industries are networked with their customers so as to facilitate faster delivery of services.
4. Educational institutions
These may use networking so as to have homogeneous information regarding every aspect. For example, fees collected from students.

b) Implications of increased electronic networking on computer security.

Computer security refers to the protection of data and programs from threats which may cause unauthorised changes and modifications of data or programs as well as protection of information systems to ensure that the system operate as designed.

Electronic networking affects computer security in that: -

1. It may result to unauthorised access to personal or confidential information.
2. It may result to deliberate modification of important data to act as cover-ups to illegal activities.
3. Electronic networking exposes data held in computers which can hurt businesses by exposing their secrets.
4. It could lead to system degradation, for example, where viruses, worms and computer related crimes are transmitted through networks.

c) Importance of active participation of senior management in design information system.

1. Information system development involves high costs and is often characterised by high investment and as such, would require sound decisions and proper control.
2. The design of an information system is critical to the success of an organisation and so senior management must be involved.
3. Information system design can be used as a commercial strategy and so proper designs may put an organisation on a competitive edge.
4. New information systems may mean a revolution in the way information is created and presented to management and so senior staff should be involved in the design stage.

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5. Information systems development is not just about the speedy processing of high volume routine transactions but also to provide information for decision making and so senior management should be involved in its design.
 6. A properly designed system not only affects the organisations but also other stakeholders and so senior management must be aware of such stakeholders.
 7. Senior management must be involved in the design of a system so as to make a real difference to successful information technology.

d) What is sub optimisation

This refers to a condition of non-fulfilment of the overall goal of a system. It occurs when the objectives of a subsystem directly conflicts with the overall objection of another subsystem. This means that the subsystems could be meeting their goals but the whole system could be meeting its goals in substandard.

An example of sub-optimisation is where a factory might use high technology plant in its operations but if as a consequence employees are neither expected to use any skill nor able to work in a group with other, the optimisation of the technological subsystem would affect the social and psychological structure and lead to inefficiency amongst employees. For example, low productivity or poor quality; thus sub-optimisation of the factory system results.

SUGGESTED SOLUTIONS TO MAY 2010

QUESTION ONE

Alternative 1:

I would advise my boss that we adopt a new platform.

Reasons:

1. The new platform would be user-friendlier due to the appealing interface and graphical objects (menus, text boxes, buttons) involved.
2. Most software today is available for the graphical interface e.g. most word processors, browsers, spreadsheets, and database management systems in the market today are for the graphical interface. Hence, the organization will have greater vendor independence.
3. Since the graphical interface is user-friendlier, it will result in lesser training costs because the system users can more or less learn basic system functions on their own.
4. The graphical user interface could improve operational efficiency. Since the GUI is easier to use as compared to the command driven interface, staff can perform their tasks such as word processing, database management, and spreadsheet editing and formatting with greater speed.

Alternative 2:

I would advise my boss against adopting a new platform.

Reasons:

1. A GUI requires a lot of system resources e.g. disk space, processor speed, powerful display monitors. This would imply additional costs in moving to the graphical interface.
2. Software required for the graphical interface would be more expensive than software required for the command-driven interface because of the convenience provided by the graphical interface.

Software utilities/ service programs.

These are system programs that provide a useful service to the user of the computer by providing facilities for common tasks of a routine nature. Common types of utility programs are sort utilities, editors, file copying, dumping, file maintenance and tracing and debugging utilities.

Usefulness of utilities to a software engineer;

1. The software engineer could use a sort utility to sort transaction files into the sequence of a master file before carrying out updating.
2. Editors could be used to create and edit programs.
3. File-copying utilities could be used in back-up programs to copy files from hard disk to magnetic tape.
4. Tracing utilities could be used to dump (copy contents of main storage onto an output device) details of internal storage (e.g. the value of a variable) after obeying specified instructions so that the cycle of operations can be traced and errors located.
5. Debugging utilities could be used to assist the software engineer locate and eliminate errors from a program.

c) Areas covered under a post-audit activity:

1. Comparison of the actual system performance against the performance objectives. This involves assessment of system running costs, benefits, etc as they compare with planned estimates.
2. The staffing needs and whether they are more or less than anticipated.
3. Any delays in the processing and effects of such delays.
4. Effectiveness of the inbuilt security procedures in the system.

5. The error rates for input data.
6. The output i.e. whether it is correct, timely and distributed correctly to the relevant users.

QUESTION TWO

a) Bar codes:

This refers to alternating lines and spaces that are printed on an item. The alternating lines and spaces represent data in binary.

Features:

1. The product must be packaged so as to provide a place to stick the bar code.
2. Size- the product must be large enough to stick the sticker.
3. Durability- bar codes are suitable for long lasting products and not for perishables like vegetables.

b) Steps that may be taken to ensure security of a password system:

1. Passwords should be changed regularly so that users who have already obtained a password illegally can be denied continued access to system resources. The network operating system could be configured by the systems administrator to implement this policy.
2. The system should be configured by the systems administrator to reject previous passwords that were changed. This measure would deny access to users who had illegally obtained a password.
3. Logon Ids not used after a number of days should be deactivated to prevent possible misuse.
4. The system should automatically disconnect a logon session if no activity has occurred for a period of time (e.g. one hour). This reduces the risk of misuse of an active logon session left un-attended because the user went to lunch, left home, went to a meeting or otherwise forgot to logoff. This policy is referred to as **'time out'**.
5. Password databases on servers or workstations should be encrypted using one-way encryption. This mode of encryption makes the passwords irreversibly scrambled thus preventing intruders from decoding them.
6. Duress passwords.

These are passwords which are issued to staff so that in the event they are kidnapped and forced to reveal a password to grant access to the system an alarm is raised to indicate to the **organization's security section that entry is being made under duress.**

7. System generated passwords

Here, the system has a routine, which generates passwords and notifies users of each new word through a secure mailing system. If a password has been changed, the system may be programmed to accept a use of the old password but to notify security, who can then monitor entry and, if on the premises, apprehend the offender.

Activities performed during systems delivery:

1. Preparation of a production environment and the transfer of programs and procedures of the new information system into that environment.
2. Finalization of documentation for use in training and everyday operation.
3. Training of end users.
4. File setup and conversion of manual files.
5. System changeover.

(i) Downsizing

This refers to the process of transferring applications from large computers to smaller ones e.g. from a mainframe environment to a client/server network with many personal computers. Client/server computing refers to a model for computing that splits processing between **—clientsll** and **—serversll** on a network, assigning functions to the machine most able to perform the function.

(ii) Cyber-café

This refers to a facility which enables an individual to access services related to computing and communication such as browsing the internet, printing, word-processing, photocopying, CD writing and faxing at a cost.

QUESTION THREE

a) Prototyping

This refers to the process of building an experimental system quickly and inexpensively for demonstration and evaluation so that users can better determine information requirements. This approach makes use of a prototype, which is a working version of an information system or part of the system meant to be only a preliminary model. Once operational, the prototype will be further refined until it conforms precisely to user's requirements. Once the design has been finalized, the prototype can be converted to a polished production system.

CASE tools

These tools provide automated graphics facilities for producing charts and diagrams, screen and report generators, data dictionaries, extensive reporting facilities, analysis and checking tools, code generators and documentation generators.

Effects of the prototyping approach and CASE tools on the development plan:

1. **Reduction in systems development time** since CASE tools automate all the major aspects of systems development and prototyping speeds up requirements analysis.
2. **Reduction in labour costs**
Since CASE tools automate major aspects of systems development, some manual roles will be eliminated meaning that the labour costs due to the development team will be reduced. Prototyping also reduces development costs because it reduces the risk of producing a system, which will be rejected by users due to lack of conformity to requirements.
3. The adoption of prototyping and CASE tools would also imply that the systems development would require more resources (Software). CASE software would be required to automate development and thus enable prototyping. This has an effect on the development budget as the new requirement would have to be reflected.

b) I disapprove the statement. Once the program is written and commissioned, the real work begins in the form of system maintenance. Studies show that 50-70% of the total development effort by programmers is spent on systems maintenance.

Reasons:

1. Programmers still need to adapt the developed system to a changing information technology environment so as to ensure that the system is compatible with current systems (Adaptive maintenance).
2. Programmers need to correct errors found in the developed system. This task could be very involving if many errors are discovered in the system's programs (Corrective maintenance).
3. Programmers will still need to modify programs to make them more efficient, more reliable, or more maintainable (Perfective maintenance).
4. Programmers still need to carry out regular checks on programs to identify areas that need attention so as to reduce future maintenance (Preventive maintenance).

It can also be argued that once the program is written and it works, then the job of the programmers is done.

Reasons:

1. Another team of programmers contracted specifically for the purpose of maintenance could carry out maintenance. Hence, the programmers who developed the system do not need to participate after systems commissioning.

2. A properly coded and tested system usually doesn't need a lot of maintenance.
3. After systems delivery, it's up to the end user to identify and report errors encountered with the system. This could be the cumbersome part of maintenance. Enforcing the changes to the system is rather easy for an experienced systems programmer if the programs were developed according to standards.
4. A program that works does not need a lot of maintenance. It may only need perfective or adaptive maintenance which is relatively easier to perform as opposed to corrective maintenance which is cumbersome.

c) Weaknesses of a conventional file approach:

1. Data redundancy and confusion
Data redundancy is the presence of duplicate data in multiple data files. Data redundancy occurs when different divisions, functional areas and groups in an organization independently collect the same piece of information. Data redundancy results in high data storage costs.
2. Program-data dependence
This refers to the tight relationship between data stored in files and the specific programs required to update and maintain those files. Every computer program has to describe the location and nature of data with which it works. In a conventional file environment, any change in data requires a change in all programs that access the data.
3. Lack of flexibility
A conventional file system can deliver routine scheduled reports after extensive programming efforts, but it cannot deliver adhoc reports or respond to unanticipated information requirements in a timely fashion. The information required by adhoc requests is somewhere in the system but too expensive to retrieve.
4. Poor security
Because there is little control or management of data, access to and dissemination of information may be out of control. Management may have no way of knowing who is accessing or even making changes to the organization's data.
5. Lack of data sharing and availability
The lack of control over access to data in the conventional file environment does not make it easy for people to obtain information. Because pieces of information in different files and different parts of the organization cannot be related to one another, it's virtually impossible for information to be shared or accessed in a timely manner.

d) (i) Multiprogramming

This refers to a method of executing two or more programs concurrently using the same computer. The CPU executes only one program but can service the input/output needs of others at the same time. Two or more programs are active at the same time, but they do not use the same computer resources simultaneously. With multiprogramming, a group of programs takes turns at using the processor.

A multiprogramming environment:

OPERATING SYSTEM	Program 1
	Program 2
	Program 3
	Unused memory

(ii) Advantages of multiprogramming:

1. It allows the user to run several programs concurrently e.g. A user may run a spreadsheet, while running a browser while also running a media player program.
2. It allows for efficient usage of computer memory (RAM). Since many programs may be held in memory at the same time.
3. It allows for efficient usage of the processor by ensuring that the processor is not idle at any given time e.g. when a program is performing input/output activity (requesting data from a storage device or sending data to a storage device) another program is allotted the processor thus ensuring that the processor is not idle while there are other programs awaiting execution.

QUESTION FOUR

a) Computer-based techniques that may be used to check computer accuracy:

1. Use of generalized audit packages

These are programs written by auditors/specialists, which can be used, on different types of systems. Given that they are general programs, they can therefore be applied in different organizations. This means that these programs can be tailored by defining the format of the files and by specifying the parameters of the output data that is required. Generalized audit packages can be used in computational checks, in detection of instances of violation of system rules, in completeness checks, and in the selection of items for audit testing i.e. helps in sampling and in formatting of data files.

2. Use of specifically written packages

These are specific software that are written so that they can interrogate or be used in a given organization. Specific written packages can be used to perform computational checks, to detect violation of system rules, to detect unreasonable data items, to check completeness of data, to select items for audit testing and to format data files.

3. Use of test packs/data

Test data is normally used by the auditor for computer processing to test for the operations of the business procedures. Test data will involve some data for which the auditor knows the expected output. This data will be processed through the system and the auditor will check whether the output is the same as expected i.e. the test data is normally confined to compliance testing and therefore it may be less variable (in terms of functionality) than audit programs.

b) Reasons:

1) Ease of understanding

DFDs, ERDs and flowcharts are graphical tools, which are easier to read through and understand as compared to blocks of narrative texts. This is because they employ the use of text and diagrams which the mind can easily comprehend.

2) Easier to identify and correct errors

Since the tools are graphical, errors can be quickly spotted and corrected as compared to narrative texts which force one to read sentence by sentence in order to decipher the meaning and thus identify errors.

3) Ability to summarize the whole system in a small space

Context level DFDs (The highest level of a DFD) summarize a whole system in a very small space. It's also possible to produce a compact (one page) system flowchart summarizing the basic system functions and processes. ERDs can also be constructed to fit a page for summary purposes.

4) Clarity

Diagrams reduce the ambiguity that could feature in narrative texts due to ambiguous sentences and paragraphs since they reduce the amount of text involved in describing a system

5) Presence of standards, which assure quality of designs

DFDs, ERDs and flowcharts have well-defined diagramming conventions. Adherence to these standards ensures uniformity of system designs, which thus aids compatibility, and understandability of system designs.

c) Strategic –Concerned with goals, operations, products, services or environmental relationships of organizations, which help an organization, gain a competitive advantage.

Questions that need to be addressed:

1. Can the information technology (IT) be used to create new products and services?
2. Can the IT enhance relationships with suppliers?
3. Can the IT enhance relationships with consumers?
4. Can the IT lower operational costs?
5. Can the IT enable the organization to tap into new markets?
6. Can the IT enable the organization to forge an alliance with another organization so as to compete more favourably?

QUESTION FIVE

a) Means that I would use to ensure project success:

1. Ensure effective communication of issues regarding systems development to staff involved via regular meetings.
2. Get adequate management support in the form of funding and goodwill.
3. Proper goal definition in the project specification to ensure that the goals of the project are clearly understood by all staff involved in its development.
4. Delegation of duties and responsibilities. The delegation of duties should be based on the skills and abilities of each team member.
5. Flexibility in planning so as to accommodate changes in future e.g. changes in technology, legislation, etc
6. Elimination of bureaucratic procedures e.g. bureaucratic communication procedures, which enhance the risk of delays in development.
7. Standardized project development so as to guarantee a quality end product.
8. Proper scheduling and estimation of time needed for the project. Scheduling and estimation of time should make a provision for some delays at each stage so as to come up with a realistic and implementable schedule.
9. Constant evaluation to ensure that the project development is according to plans.

b) Situations whereby wireless communication is favourable over guided communication:

1. When there are **geographical barriers** to be encountered e.g. mountains, rivers, and oceans. Geographical barriers hinder cable installation but they do not affect wireless communication. Hence wireless communication is suitable for sites where such barriers are to be found.

2. **Area of coverage is large** e.g. global coverage. Wireless communication would be suitable because there are no cabling costs involved as compared to the high cabling costs that would be incurred with the guided communication.
3. When the **sender and receiver are mobile** e.g. in mobile telephony. Wireless communication would be suitable because it can accommodate the movements of sender and receiver since there is no guided link to tie down the sender and receiver to a specific location.
4. When the **risk of sabotage** must be reduced. Wireless communication is less susceptible to sabotage because of the absence of a cable link between two communicating nodes.
5. **Broadcast communication** e.g. Television broadcasts. Using wireless communication would reduce cabling costs.
6. **Fast deployment is required** e.g. news reporting, seminars etc. In such an instance installing a wireless communication network would be faster than installing a guided communication network.
7. **Where cabling may not be run** e.g. listed buildings

c) **Fourth generation language:**

A programming language that can be employed directly by end users or less skilled programmers to develop computer applications more rapidly than programming languages.

Prototype:

This refers to a preliminary working version of an information system for documentation and evaluation purposes.

Facilities of 4GLs:

1. **Query languages e.g. SQL**
They could be used in retrieving data stored in databases or files in a prototype application.
2. **Report generators e.g. RPG III**
They extract data from files or databases to create customized reports in a wide range of formats not routinely produced by an information system. Report generators could be used to implement the reporting facility of a prototype.
3. **Graphics languages e.g. SAS Graph, Systar**
They retrieve data from files or databases and display them in a graphic format. Some graphics software can perform arithmetic or logic operations on data as well. Graphics languages could thus be used to implement prototypes, which prevent graphing features.
4. **Application generators e.g. FOCUS, PowerBuilder**
They contain pre-programmed modules that can generate entire applications including websites greatly speeding development. A user can specify what needs to be done, and the application generator will create the appropriate program code for input, validation, update, processing and reporting.
5. **Very high programming language languages e.g. APL, Nomad2**
They generate program code with fewer instructions than conventional languages such as COBOL or FORTRAN. They are designed primarily as productivity tools for professional programmers who may need to code a prototype in a short period of time.

QUESTION SIX

a) Types of feasibility assessments that need to be performed:

Technical feasibility

This deals with equipment and software e.g. determination of whether the new system can be developed using the current facilities of the company. Technical feasibility evaluates the hardware required for the new system, the software required for the new system, whether the current facilities are adequate or inadequate for the new system after implementation, the current technology and how it's applicable to the new system, etc

Social feasibility/ Operational feasibility

This mainly deals with the effect of the system on the current society within the company. It focuses on:

- The reaction of individuals both inside and outside of the company as a result of the new system.
- The effect of the system on the existing organizational structure.
- The effect of the system on the current working practices and management levels i.e. whether there would be any change required and if so, the cost of the change socially.
- Redundancy or retrenchment, implication to the company as a result of the new system.
- Implication of the system on existing staff programmes.

Legal feasibility

This deals with the legal implications of the new system e.g. If it requires that the computer should be insured or whether the stored data should be registered with the government before use. Generally, any legal aspects associated with the new system should be assessed, and adequate measures taken to protect the interest of the user company.

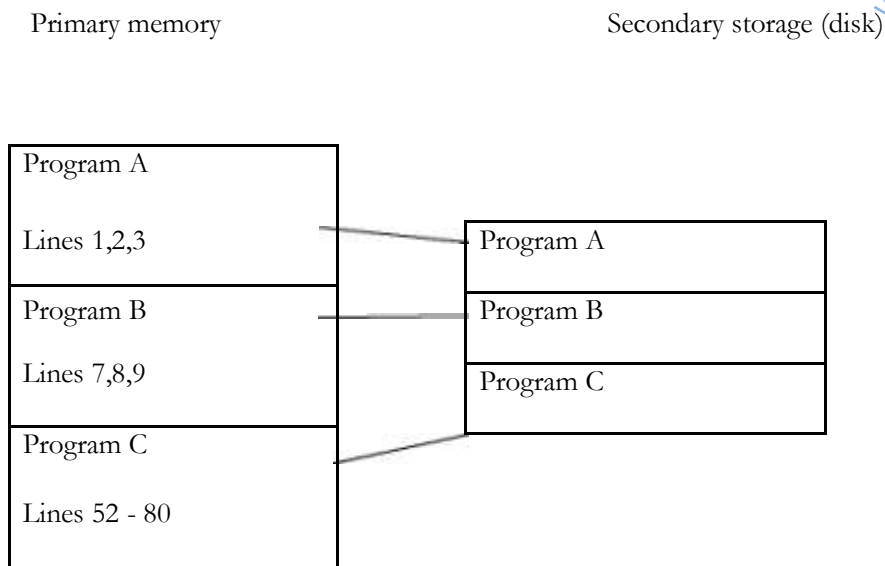
Economic feasibility

This is aimed at determining whether or not to continue with the project, depending on whether the project is economically viable. The systems benefits and estimated implementation cost should be determined before any further resources can be spent on the project. A cost-benefit analysis (CBA) is carried out to determine whether the new system is economically viable.

b) Virtual memory/storage

This refers to the computer arrangement whereby the computer divides programs into fixed or variable length portions, storing only a small portion of the program in primary memory (RAM) at one time. Only a few statements of a program actually execute at any given moment.

Virtual storage thus permits a very large number of programs to reside in primary memory because only a tiny portion of each program is actually located there thus resulting in efficient RAM usage. All other program pages are stored on a peripheral disk unit until they are ready for execution.

Virtual memory implementation:

c) Either:

I agree with the statement that computers have resulted in job losses. The automation of many business tasks has meant that few personnel are required to perform the tasks. Many organizations have taken advantage of automation to downsize their labour forces. Specific industries in which downsizing has occurred include:

1. Banking industry

Adoption of ATMs (Automated Teller Machines) has resulted in many over-the-counter transactions being redirected to the ATMs. This has resulted in the downsizing of bank clerks.

2. Supermarket industry

The adoption of point of sale systems has improved the efficiency of sales processing. This has resulted in fewer counters hence, fewer sales clerks.

3. Accounting

Computer programs have automated many accounting functions e.g maintenance of ledger accounts, preparation of financial statements, etc thus improving their efficiency which means that fewer accountants are now required.

4. Manufacturing industry

Process control systems have eliminated the need for a human being to monitor and control industrial processes e.g. maintaining a constant temperature during distillation of spirits, manufacture of rubber, etc

5. Music industry

The mp3 revolution has drove out music retailers out of the industry. Nowadays, mp3 versions of hit songs and albums are available freely over the Internet. This has resulted in a decrease in the number of original CDs sold by CD and tape vendors which results in job losses in the music retailing industry to cope with the decreased business.

Or:

I disagree with the statement that computers result in overall job losses. Despite the fact that computers have resulted in initial job losses, they have created many jobs to offset the initial losses. These jobs are concerned with systems support, systems development and management of information technology. The jobs/ roles include:

1. Network administration

This comprises of system administration (providing user support) and maintenance of computer networks.

2. Systems analysis

This consists in examining a business area to identify areas that need computerization, designing an information system to meet user requirements and implementing the information system to solve business problems. Systems analysis carried out by the systems analyst.

3. Programming

This involves translating program design into program code in a high-level language.

4. Database administration

This involves managing an organization's database.

5. Systems support

This involves providing technical support to ordinary computer users.

6. Information technology management

It involves overseeing the running of the information technology department. The information technology manager also works with other senior organization managers to formulate policies that will help the organization attain a strategic advantage.

7. Data entry

This consists in entering data to the information system through a computer.

It could also be argued that cost savings by firms that have adopted the use of information technology have been rerouted to other investments/ branches opened thus providing an opportunity for creation of other non-IT related jobs e.g. management, public relations, accounting, etc

QUESTION SEVEN

a) Reasons for controlling data inputs:

- To check and ensure the accuracy of the data inputs.
- To check and ensure the completeness of data which has been input.
- To ensure that the output information is free from error thus enabling it to be used to generate desired results.

Methods that may be used to control data inputs:

1. Control totals

These are totals established beforehand for input and processing transactions. These totals can range from a simple document count to totals for quantity fields such as total sales amount (for a batch of transactions). Computer programs count the totals from transactions input or processed.

2. Edit checks

These are programmed routines that can be performed to edit input data for errors before they are processed. Transactions that do not meet edit criteria will be rejected. For example, data might be checked to make sure they were in the right format (a 9-digit social security number should not contain alphabetic characters). Edit checks may include sequence checks, limit checks, range checks, etc

3. Computer matching

This matches input data with information held on master or suspense files, with unmatched items noted for investigation. For example, a matching program might match employee time cards with a payroll master file and report missing or duplicate time cards

4. Check digit

A numeric value that has been calculated mathematically is added to data to ensure that the original data have not been altered or an incorrect value submitted. This control is effective in detecting transposition and transcription errors. For example, a check digit is added to an account number so that it can be checked for accuracy when it's used.

Other methods:

5. Reasonableness check.
6. Completeness check.

b) The briefing document could be an internal memo, a notice or a formal report to management.

Usefulness of training:

1. Training results in minimal time wastages in business operations, as staff are aware of how to perform the operations.
2. Training reduces the risk of damage to hardware and software resources by staff due to ignorance.
3. Training ensures efficient use of systems since users are aware of all system functions.
4. During the process of training, areas for maintenance in the current system could be identified by identifying data processing errors and system inefficiencies.

d) Database technology

This utilizes a database, which is a collection of data organized to serve many applications at the same time by storing and managing data so that they appear to be one location.

Client/Server computer system

This refers to a **system that splits processing between —clientsll (i.e. the user point-of-entry for the required function and is normally a desktop computer, workstation computer or laptop computer) and —serversll (i.e. a terminal which provides the clients with services e.g. a mainframe or a desktop computer) on a network, assigning functions to the machine most able to perform the function.**

Client/server computer systems facilitate database technology by enabling large databases to be stored on servers and to be shared to clients over the network such that the data appears to be in **one location while it's actually distributed on several servers.**

c) Information systems could be used to perform decision making or to supply the decision maker with adequate information to make a sound decision. Transaction processing systems, could be used to aid structured decisions e.g. a point of sale system could generate an exception report when stock levels are low thus alarming the stores manager to reorder stock. Decision support systems could be used to perform semi-structured decisions e.g. fraud detection or unstructured decisions e.g. corporate planning and forecasting while Executive information systems could be used to unstructured decision making e.g. processing an insurance claim.

QUESTION EIGHT a)

Electronic business

This refers to the process of buying and services electronically involving transactions using the Internet, networks and other digital technologies. Electronic business also encompasses activities supporting those market transactions such as advertising, marketing, customer support, delivery and payment.

(i) Smart cards

These are credit-card-sized cards that store digital information that can be used for electronic payments in place of cash. Contact smart cards need a special card reading device to facilitate a transaction. Internet users must attach a smart card reader to use the card. To pay for a web purchase, the user swipes the card through the card reader.

Smart cards facilitate the quick and convenient transfer of funds to online and offline merchants.

(ii) Electronic Data Interchange (EDI) systems

Electronic data interchange is the direct computer-to-computer exchange between two organizations of standard business transaction documents.

Electronic data interchange facilitates the quick exchange of business documents such as purchase orders, payments, shipping notices, price updates and invoices.

(iii) World Wide Web (WWW)

It's a system with universally accepted standards for storing, retrieving, formatting, and displaying information in a networked environment.

The web facilitates multimedia (text, graphics and sound) hence it's an effective advertising resource.

The web also bridges the gap between sellers and buyers since it makes it easy to link resources that are half-a-world apart. The linking is through hyperlinks that enable web pages stored on the same or different machines to be linked. On-line customers thus access an e-commerce website that is hosted on a distant server at the click of a button.

The World Wide Web also facilitates secure transactions through various web protocols aimed at guaranteeing security of information being transmitted over the Internet.

(iv) Automated Teller Machines (ATMs)

An ATM is a specialized data input device that is used for transaction processing mainly in the banking industry.

ATMs in addition to facilitating ordinary business transactions (e.g. withdrawing money, requesting for statements, getting mini-statements, getting account balances, etc) also enable customers of a bank to pay their utilities e.g. electricity bills, phone bills, water bills, etc

b) Possible uses of an expert system within a customer database department:

1. Producing a list of customers who are eligible/ can be granted credit transactions. This is after evaluation of past credit history and the financial capability of each customer.
2. Deciding whether a debt can be considered as a bad debt. The expert system could assess the duration, the amount and the credit/ payment history of a customer to determine whether a debt should be classified as a bad debt. This information is useful for accountants as they draw up the relevant accounts.
3. Marking customers as deceased after a reasonable period of time e.g. A customer who registered with an organization while 35 years old could be considered deceased after 80 years. This enables a realistic count of the organization's current customers.

c) Object-oriented programming:

An approach to software development that combines data and procedures into a single object. The object combines data and program code. Instead of passing data to procedures, programs send a message for an object to perform a procedure that is already embedded in it. The same message may be sent to different objects, but each will implement that message differently.

Advantages for a company moving towards an object oriented programming approach:

-
1. Reduced time in developing software. OOP enables program code to be reused in related applications thus eliminating the need to code.
 2. Reduced software development costs due to reduction in development time.
 3. Improved programmer productivity. The reusability feature of OOP enables programmers to borrow code from reusable software libraries thus saving them time that would have been spent coding. The programmers could thus be freed to more complex problem solving tasks that require creativity.
 4. Compatibility. Most organizational software today is being developed using the object-oriented approach. By migrating to this approach, an organization ensures compatibility of developed systems with currently existing ones.

SUGGESTED SOLUTIONS TO DECEMBER 2010

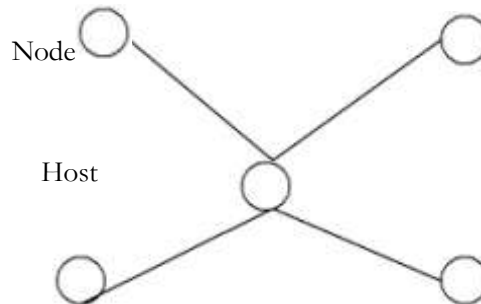
QUESTION ONE

a) Network topology

This refers to the method of arranging and connecting the nodes of a network.

STAR TOPOLOGY

With this topology, there are a number of small computers or peripheral devices linked to a central unit called a main hub. The central unit may be a host computer or a file server. All communications pass through the central unit and control is maintained by polling. This topology is commonly used for linking microcomputers to a mainframe.



This topology has high cabling costs associated with it since there must be a connection to and from the central unit each node (terminal) in the network to the individual devices.

This topology is fault tolerant in that problems with a communication link between a node and the central unit do not disrupt communication for the rest of the network. However, if the central unit fails, the whole network fails. This fault tolerance depends mainly on the status of the central unit for this type of network.

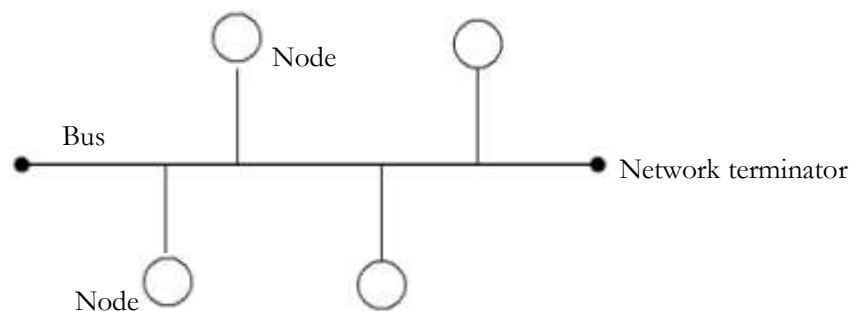
The star topology lowers in performance as the number of nodes increase. The central unit in such a case, will be faced with a larger number of nodes to service and since it can only handle one request from a node at a time then there will be a longer waiting time incurred by nodes wishing to use the central unit.

This topology could be used to reduce the redundancy of the data stored on the network by providing a centralized data store on the central unit.

BUS TOPOLOGY

In this topology, each device handles its communication control. There is no host computer, however there may be a file server. All communication travel along a common connecting cable called a bus. The bus network is a common arrangement for sharing data on different microcomputers.

Diagram:



The bus configuration requires very little cable to connect the computers and therefore it's less expensive than other cabling arrangements.

This configuration is relatively fault tolerant as the failure of a node does not bring down the entire network. However, the failure of the connecting cable (bus) results in entire network failure.

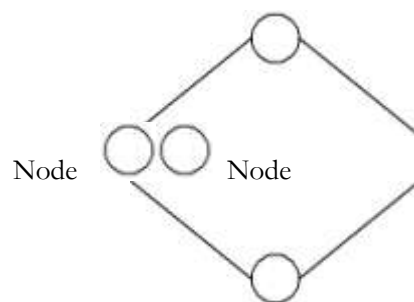
As the number of nodes increases, the performance of the bus topology decreases. A large number of nodes would result in heavy network traffic, which would slow down a bus considerably since computers would interrupt each other and use a lot of bandwidth.

This topology may also be used to eliminate data redundancy on the network. In this case, a file server is used to provide a centralized shared data store. All the other nodes wishing to use the data could access the file server through the bus.

RING TOPOLOGY

In this topology, each device is connected to the other devices, forming a ring. There is no central file server or computer. Messages are passed around the ring until they reach their destination. This topology is commonly used to link mainframes over wide geographical areas.

Diagram:



A lot of cable is required for this topology and hence the cabling costs are very high.

This topology has low fault tolerance since failure of one component on the network can affect the whole network.

The larger the network, the more the time it takes for data to travel round the ring and hence the longer the wait time for a distant destination node along the ring.

This topology does not eliminate data redundancy since there is no central computer or file server to provide a centralized shared access to stored data.

b) Stages involved in systematic management of information systems:

1. Identification of the organization's assets

This involves taking an inventory of all the organization's information security assets e.g. computers, data, personnel, programs, networks, etc

2. Determination of the risks to the assets

For each asset a list of associated risks is produced. For instance, for computers, associated risks include:

- Fire

- Vandalism
- Theft, etc

3. Estimating likelihood of occurrence of each risk

The likelihood of occurrence may be generally classified as high, low or medium.

4. Computation of expected annual losses due to occurrences of the risks.

5. Surveying applicable risk controls and their costs.

6. Selection of appropriate controls

The selection is largely determined by the cost of the control. Where the cost of the control exceeds the estimated loss due to the occurrence of the risk, the control is discarded and an alternative one selected.

7. Projection of annual savings due to the controls

An estimate of the annual cost savings to an organization should be produced with the costs of the controls in mind and the levels of occurrence of the associated risks reduced.

8. Implementation of the risk controls

This should be after management has assessed and approved the selected controls and their cost savings.

9. Review of controls to determine their effectiveness in preventing the occurrence of risks.

10. Implementation of review findings.

QUESTION TWO

a) Prototyping/ Heuristic development

This refers to the process of creating a system through trial and error. This approach uses faster development tools such as 4th generation languages (4GLs) that allow a user to see a high level view of the workings of the proposed system within a short period of time. The initial emphasis during development of the prototype is usually placed on the reports and screens, which are the system aspects most used, by end users.

Contribution of prototyping to the resolution of complexity of information systems development:

1. Prototyping simplifies the process of systems analysis.

Through the use of prototypes, the task of getting user requirements such as reports requirements and screen requirements is very easy as prototypes (preliminary working versions of an information system used for demonstration and evaluation) could be used to capture all user requirements.

2. Prototyping simplifies systems design

In throwaway prototyping (Approach to prototyping whereby the final version of the prototype is discarded and a new system developed using a high level language), the throwaway prototype forms the basis for system designs. The systems designers only need to produce a system design that can be implemented using a high-level programming language.

3. Prototyping guarantees acceptance testing

The process of presenting a prototype version to the end user for evaluation is a form of acceptance testing. This process is carried out with every version of the prototype cycle. Thus, prototyping assures that the system is acceptable to the end user because it involves rigorous acceptance testing. Since the end user was involved in the implementation, then it follows that he'll accept the program.

b) Tasks involved in conceptual design:

1. Establishing the operational feasibility of a system

A system request is operationally feasible if it's highly likely that the system will be accepted once implemented. It's organizationally feasible if the potential impact of the system to the organization is not adverse. The process of establishing the operational feasibility of a system involved collection of views from users of the current system on whether the current system is liked and effectively used. Establishing the operational feasibility also

involves determining whether end users will be involved in planning the new system. The more the end users are involved in the earlier stages of the lesser the resistance they would pose. Establishing whether management supports the development of a new information system is another task involved in establishing the operational feasibility of a system.

2. Establishing the technical feasibility of a system

A system is technically feasible if an organization has or can acquire the equipment and personnel to develop and install the system. Establishing technical feasibility involves resolving the following issues:

- The ability of the organization to acquire the necessary equipment.
- The ability of the organization to acquire the necessary technical expertise.
- The ability of the organization to handle the projected growth of the organization for the foreseeable future.
- The ability of the hardware and software to supply adequate performance.

3. Establishing the economic feasibility of introducing or developing a new system

A system request is economically feasible if the cost of developing the system plus running costs are far outweighed by the benefits of the new system. Establishing the economic feasibility of a system request involves developing a business case for each recommended course of action. A business case is a structured proposal for business process improvement that supports planning and decision making including decisions about whether to buy or develop, which vendor to choose and when to implement. Business cases are summarized by use of well known financial matrices such as net cash flow, discounted cash flow, and internal rate of returns.

4. Preparation of the feasibility report showing the technical, operational and economic feasibilities.

Challenges faced in systems maintenance:

1. **Poorly documented programs** – These make corrective maintenance very difficult.
2. **Poor user cooperation** – Users who are uncooperative in identifying system errors or inefficiencies hinder corrective maintenance.
3. **Lack of standards in the system being maintained.** This makes it difficult to carry out adaptive, corrective and preventive maintenance.
4. **Changing user needs** – This results in frequent maintenance which is tedious and costly.
5. **Changing hardware and software.** This necessitates frequent adaptive maintenance, which is tedious and costly.
6. **Poor management cooperation.** Lack of cooperation in the form of adequate funding and goodwill may hinder systems maintenance.

QUESTION THREE

a) Data/ program independence

This refers to the independence between data stored in files and the software programs required to update and maintain those files.

(i) Importance of data/program independence:

It enables changes to a database to be implemented easily. For instance, in a system changes in data such as tax rates or ZIP code length do not require changes to the programs that access the data.

(ii) Security features that need to be instituted:

1. **Backup and recovery procedures** to enable recovery from system failure.
2. **Authorization** – To prevent unauthorized access to data. Authorization may be through usernames and passwords.
3. **Transaction locks i.e. write locks and read locks.** These prevent the problem of lost updates (situation that arises when two or more programs try to update a database concurrently but the resultant update is incorrect)

- o **Checkpoints and journals.** A checkpoint is a —snapshot of the database before it was updated by a program(s). A journal holds the details of subsequent updates to a database. Checkpoints and journals assist in recovery from system failure.
- p **Provision of different views of the database** for different categories of users in order to limit access to sensitive data.
- q **Encryption** —Coding of data by special algorithm that renders them unreadable without decryption. Encryption prevents unauthorized access to sensitive data.

b) Information systems audit

This is an activity aimed at reviewing and evaluating whether proper and adequate information system controls, procedural controls, and physical facility controls have been developed and implemented. The scope of an information systems audit includes:

- o Budgeting and finance
- o New systems development
- o Applications
- o Operations
- o Data security and privacy
- o Recovery

Factors that may complicate the audit of computerized systems:

1. Large system size

A large system size implies that each scope of the audit will have many subsets of activities. This necessitates proper planning and scheduling of the activities. Therefore a large system size makes the audit long.

2. Absence of software to assist in the audit.

This would mean that the entire audit would have to be manual. This is tedious.

3. Uncooperative staff (Information systems staff)

The information systems auditor will be required to interview information systems staff concerning the use of the system i.e. the activities and procedures involved. Uncooperative staff would complicate the task of the auditor.

4. Complex organizational structure

The MIS auditor is required to have a thorough understanding of the organizational structure before performing an audit. This is because the organizational structure largely determines information flows within the organization and thus the audit. A complex organizational structure would thus complicate the work of the auditor.

5. Many system interfaces

A system interface is a point where two systems meet and share inputs and outputs. Numerous system interfaces make it difficult to trace system inputs and outputs during sample transactions.

c) Implementation problems:

1. Poor programs due to poor pseudocode, flowcharts, decision tables.
2. Inappropriate hardware due to poor hardware specifications.
3. Poor error handling and recovery procedures in the implemented system because of poor technical documentation.
4. Incompatible software due to poor software specifications.

QUESTION FOUR

a) World Wide Web (WWW)

This refers to a system with universally accepted standards for storing, formatting and displaying information in a networked environment. Information is stored as electronic —pagesll that contain text, graphics, animations, sound and video.

(i) How the WWW can take services closer to people:

1. WWW enables **online teaching/instruction**. A tutor of ABC College could conduct a class for many students of the college located in different geographical areas. The students simply need to log-on to ABC's website and access the live streaming video of the class which is being conducted at ABC's head quarters.
2. WWW can facilitate **sharing of information to online users**. The information could be placed in web pages and links provided between webpages to enable easy access to the information. Thus, ABC College could for instance share study packs online to registered students thus enabling distant students to easily access study resources.
3. WWW makes it possible for students of ABC Tutorial College to easily participate in **discussion forums**. A discussion group facility could be implemented in the College's website to enable students to post their views via e-mail. Students need not travel to the College to participate in discussion forums.
4. WWW can enable students to sit for tests/exams at their own convenient locations through **online testing**. Students only need to go to the closest exam center as opposed to going all the way to ABC's headquarters.

(ii) Managerial issues critical for the successful implementation of WWW:

1. Proper planning of resources e.g. funds, hardware, and software required, personnel required, etc
2. Adequate control mechanisms have to be put in place to ensure security of the system.
3. Training of staff to ensure they are competent with the system.
4. Education of staff on the importance of WWW so as to reduce potential resistance to the introduction of WWW into an organization.
5. Reengineering of business procedures to accommodate WWW where possible in order to ensure maximum utilization.

b) Batch processing system

This refers to a system where data is collected together over some interval of time and then processed together as a batch

Real-time system

This refers to a computer system capable of processing data so quickly that the results are available to influence the activity currently taking place.

Suitable file designs:

For the batch-processing system, I would recommend a database system of files with sequential organization (records are arranged according to the value of a certain field e.g. records may be arranged according to employee number in the employees file). The payroll program requires data from different files (e.g. personnel, accounts, etc) to generate a payroll. An integrated file approach/database system would thus enable the payroll application(s) to access many different files without problems of data redundancy.

For the inventory applications, I would recommend application specific files (Files (on any media) in which records are grouped according to a common purpose or dedicated to a single application.) Inventory applications such as stock inventory systems require only specific types of data e.g. stock Id, description, stock quantity, price, etc, which can be organized and

maintained in a specific file e.g. a stock file or a stock inventory application. With an application specific system, file security is maintained since the files are read from and updated by specific programs, to which access is limited, usually by a password, the programs used to access the files being in a user account or accessible area.

c) (i) Differentiation

This is the integrations of a system into sub-systems.

(ii) Entropy

This refers to the tendency towards disorder (chaos) in a system. The more closed a system is, the greater the entropy.

QUESTION FIVE

a) Components of an accounting system:

1. People component.

The people needed in the accounting system include accountants, managers, database administrators, systems analysts, etc

2. Computer hardware.

These include computer monitors, hard disks, magnetic tape, processors, printers, etc

3. Computer software

Examples include operating systems, word processors, accounting packages, communication software, etc

4. Telecommunication system/communication network

5. Databases to store all the data operated upon by software.

6. Procedures

The formal operating procedures exist in physical forms as manuals or instruction booklets. Three major types of procedures that must be present are:

- User instructions – for application users to record data, to use a terminal for data entry or retrieval, or use the result
- Instructions for preparation of input by data preparation personnel
- Operating instructions for computer operations personnel

b) (i) Application of the internet to healthcare:

1. Advertising of drugs on websites
2. Online purchase of common drugs e.g. cough medicine, aspirin, etc
3. Doctor-patient communication e.g. a doctor could use e-mail or chat services to communicate with a patient to check on the effect of a prescribed medication has thus eliminating the need for the patient to travel all the way to the clinic.
4. Circulation of regarding epidemics to enable people to be cautious about preventive measures.

(ii) Application of the Internet to banking:

Online banking

This refers to a computerized banking system that enables customers to do most of their banking transactions via home computers linked to proprietary networks or the internet. Online banking has enabled customers to perform balance enquiries online and even cash/cheque deposits. For cash/cheque deposits, the cash/cheque is mailed using a safe courier service.

c) (i) Transaction processing systems. Maintenance of a generational ledger is a procedure at the operational level of the organization. It's routine and thus it's best handled by a transaction processing system which is designed to carry out routine, repetitive procedures.

(ii) An expert system. Formulation of market strategies is a task carried out at the strategic level of an organization. It's an unstructured process, which is non-routine in nature. Expert systems would address this task since they are designed to handle unstructured decision-making.

(iii) A decision support system. Financial sensitivity or risk analysis may be considered as a semi-structured task since certain steps must be followed and at the same time each step may be open to a flexible approach.

(iii) Transaction processing system. Making ticket reservations is a routine, repetitive procedure at the operational level of a ticket reservation company. It's best handled by a transaction processing system since transaction processing systems are designed to carry out routine, repetitive tasks.

d) Factors that influence the structure of an information system:

1. The nature of an organization

This would influence the standard operating procedures and tasks of a system.

2. Changes in Information technology

These changes influence the hardware and software since an organization will be forced to upgrade to keep up with such changes. They include changes in the version of an operating system e.g. from Windows 95 which has limited networking and security capabilities to Windows 98 which has advanced networking and security capabilities. Changes in hardware may be due to the introduction of faster microprocessors e.g. the Intel Pentium IV 2.6 GHz microprocessor which will force organization's running real time applications to upgrade in order to improve on response times.

3. Environmental factors such as legislation, business market conditions.

Legislation influences the standard operating procedures of a system by specifying the dos and don'ts e.g. the Company law in Kenya lays a frame work for the operation of companies. Market conditions may dictate the system outputs e.g. Competition may force a business to design the system to produce periodic reports that enable the progress of the organization to be gauged.

4. The people in the system

The staff that works with an information system may influence the information that is contained in a system. For example, knowledge workers such as doctors and engineers may influence the content of the systems they handle since they are supposed to contribute to the information contained in the systems.

QUESTION SIX

a) Freeware

This refers to freely available software which can be acquired from the sources listed i.e. the Internet, magazine vendors, etc

Implications of using freeware:

1. Cost savings –Because the software is free

2. Compromised software quality

Almost all freeware is offered only for the purpose of evaluation. This contains many uncovered errors by adopting such freeware an organization compromises in the quality of its systems.

3. No systems maintenance offered by the software creators or distributors. Since freeware is free, the creators or distributors have no obligation to provide maintenance. The organization acquiring freeware would thus have to perform its own maintenance. This may be costly.

4. Compromised system quality

Freeware is usually an avenue for the propagation of viruses thus it compromises system security.

5. Poor software documentation

Freeware is not issued with hardcopy documentation. The softcopy documentation available with freeware is usually sketchy or incomplete.

b) (i) Utility

This refers to the ability of a program to satisfy the needs of the user.

(ii) Reliability

This refers to the extent to which a program can be expected to perform its intended function with required precision. A reliable program is therefore one that constantly performs its functions correctly.

(iii) Maintainability

This refers to the effort required to locate and fix an error in an operational program. A maintainable program is thus one in which it's easy to locate errors and fix the errors.

(iv) Efficiency

This is a measure of the amount of computing resources required by a program to perform a function.

(v) Security

This refers to the ability of a program to guarantee security of the data it handles e.g. to be able to prevent unauthorized access.

c) Application packages:

1. Word processors e.g. MS Word
2. Communication software e.g. MS Outlook
3. Database management software e.g. MS Access
4. Spreadsheets e.g. MS Excel
5. Presentation software e.g. MS PowerPoint.

QUESTION SEVEN

a) Outsourcing

This refers to the process of contracting computer center operations, telecommunications networks, or applications development to external vendors.

Reasons for outsourcing:

1. Cost Effective
Outsourcing if well initiated and managed could be more cost effective than maintaining an organization's computer center or information systems staff.
2. Outsourcing enables a company with fluctuating needs for computer processing to pay for only what it uses rather than build its own computer center, which would be underutilized when there is no peak load.
3. Outsourcing enables an organization to free up scarce and costly talent for activities with higher payback.
4. Outsourcing frees an organization's information systems staff of the task of keeping up with technological change or innovative practices. This thus eliminates associated training costs.
5. Outsourcing enables an organization with minimal/no human resources (IS staff) to perform systems development since it contracts the process of development to external vendors.
6. Outsourcing may mean getting quality, since the vendors outsourced to are usually specified in their field and thus they have the necessary expertise required to produce quality systems.

b) Importance of periodic reviews of information systems projects:

1. To ensure that information systems are being developed according to laid out standards, which guarantee quality.

2. To inspect the work of inexperienced staff.
 3. To ensure that systems development is according to the project plan in terms of time spent at each stage, costs, manpower, etc
 4. To evaluate the possibility of involving new methods and techniques so as to enhance systems quality.
 5. Periodic reviews enable project staff to identify and correct errors early in systems development.
 6. To identify problems encountered during development e.g. inadequate funds, inadequate manpower, etc
- c) Cost-benefit analysis

This refers to a phase in the project selection process whereby the economic performance to a proposed system project is evaluated in terms of the probable costs and benefits.

Cost items considered during a cost-benefit analysis:

- Hardware costs.
- Telecommunication costs.
- Software costs.
- Service costs e.g. training of users, maintenance
- Personnel costs.

Intangible benefits

These are benefits that cannot be quantified. Intangible benefits that may be considered during cost-benefit analysis:

- i Improved asset utilization.
- ii Improved resource control.
- iii Improved organizational planning.
- iv Increased organizational flexibility.
- v More timely information.
- vi Increased organizational flexibility.
- vii More timely information.
- viii Increased organizational learning.
- ix Legal requirements attained.
- x Enhanced employee goodwill.
- xi Increased job satisfaction.
- xii Improved decision-making.
- xiii Improved operation.
- xiv High client satisfaction.
- xv Better corporate image.

QUESTION EIGHT

a) Measures that may be taken to overcome shortage of staff:

1. Outsourcing

The organization could outsource systems development to an external vendor who will thus provide the systems development staff to overcome the shortage.

2. Hiring of more staff

Systems development staff e.g. programmers and a system analyst could be hired to overcome the shortage of expertise thus making all development options open.

3. Contracting the services of freelance programmers

Their services could be used for the duration of the project and then terminated at the end of the project.

4. Training of organizational staff

Staff in other organizational departments e.g. accounts, sales, human resources, etc could be trained to perform certain roles in systems development and thus overcome the shortage of staff required to perform those roles. For instance, the staff could be trained on how to test the system and also how to carry out basic systems maintenance.

b) Electronic point of sale system

This is basically an electronic cash register that is linked to a computer, or that records data onto cassette or cartridge. In its simplest form, the electronic point of sale system may simply transmit details of a transaction to the computer for processing. The more complex terminals can communicate with the computer for such purposes as checking the credit position of a customer, obtaining prices from file and ascertaining availability of stock.

Types of decisions supported:

1. Granting or denying purchase of goods by a customer.
2. Reordering of stock when levels are low.
3. Awarding discounts on purchases.

Information required to support decisions:

1. A customer's outstanding balance may determine whether the customer is denied or granted purchase.
2. Stock levels will determine the reordering of stock.
3. To award a discount on a purchase, the gross value of the sale and the discount rate are required in addition to the minimum value of sales that qualifies for a discount.

c) Automated software development tool (CASE tool)

This refers to a tool that computerizes the step-by step methodologies for software and systems development to reduce the amount of repetitive work the software needs to do.

Functionalities or tools required by an automated software development tool:

1. **Automated graphics facilities** for producing charts and diagrams. These could come in handy when diagramming various aspects of the system during documentation.
2. **Screen and report generators**, which aid the user to produce quality reports, and screendesigns.
3. **Data dictionaries**- these describe in detail the components of graphical models (Data flow diagrams, Entity relationship diagrams, Flow charts, etc).
4. **Extensive reporting facilities** for report production.
5. **Analysis and checking tools**- useful for organizing and documenting systems requirements that are obtained from the analysis phase. Checking tools enable the developer to ensure development standards are adhered to.
6. **Code generators** to produce program code.
7. **Documentation generators** to produce systems documentation.

SUGGESTED SOLUTIONS TO JUNE 2011

QUESTION ONE

a) Strategic planning:

This refers to planning that covers a long period of time, usually 5 to 7 years. The planning determines the long-term objectives, resources and policies of an organization.

OPERATIONAL DECISIONS

They are concerned with daily or routine operations of the organization relating mainly to its primary activities. Examples include decisions to reorder stock when the stock is almost sold out and decisions to suspend a client from purchasing goods and services on credit due to an outstanding balance.

How data required to support strategic planning differs from that required to support operational decisions in terms of:

(I) Time Period Referred To

Data required for operational decisions usually covers a short time period usually in days or months. For example, data relating to the outstanding balance of a customer that determines whether or not the customer should be allowed to purchase more goods and services on credit usually spans a few days or utmost a month.

Data required for strategic planning usually covers a longer time period, usually in years. From this data, forecasts can be made concerning market trends e.g. a plan to start another branch needs forecasts into the future say, in terms of sales, expenses, etc

(II) The Source or Origin of the Data

Data required for operational decisions usually originates from within the organization. For example, stock level data and clients outstanding balances can only be sourced from within the organization in order to influence operational decisions.

Data required for strategic planning usually has a greater external orientation. For instance, data about global markets that can influence an organization to globalize is external to the organization.

b) (i) Validation

This refers to the process by which a computer system identifies and reports incorrect data items. Validation occurs during data processing.

Validation checks that should be incorporated into the program:

1. **Sequence checks** e.g. checking whether employee numbers are in sequence
2. **Limit checks.** For instance, salaries of employees should be checked within a certain limit e.g. not more than Ksh 2,000,000
3. **Range checks-** could be used to check the correctness of processed salaries.
4. **Validity checks** for coded data. For instance, marital status of employees could be checked for M (i.e. married) or S (i.e. single) and anything else should be rejected.
5. **Reasonableness check.** For instance, a processed pay slip, which indicates a negative salary, should be investigated for error.
6. **Existence check** to ensure that all fields of a file contain an entry after data entry is complete.
7. **Check digits-** to detect transcription and transposition errors.

(ii) Testing enables errors in the software to be identified and corrected before the software is implemented. This testing ensures that the implemented system is highly reliable and free from error.

(iii) Measures that must be taken to simplify user training and support:

1. Use of an online training and support system

Online training and support would be easily available to users at any time. The training and support could be provided at a specific site in the intranet (Organization's computer network) with multimedia (Text, sound and graphics) used to enhance understanding.

1. **Training schedules** could be supplied to system users so that they know in advance howlong the training is supposed to take and what is expected of them during the training. This would improve user cooperation and thus simplify the training.
2. **Training should be carried out in phases** so that users are gradually familiarized with the information system. A general timing approach to be used could be as follows:
 - Before the feasibility study whereby the users are given a general explanation of computer systems and their relevance in function application and reason for the desire to introduce a computer in the specific functions on the organization.
 - Before investigation where users are explained about the impact of the new system and the importance of their involvement in development.
 - During fact finding so that they can cooperate and provide useful information to guide the system developer during the analysis phase of SDLC.
 - Before programming so that they can prepare themselves for specific roles at the implementation stage. These may include testing activities or roles.
 - Before implementation to enable users cooperate and play their roles as assigned to them.
 - After implementation in order to assist in evaluation of system performance.

QUESTION TWO

- a) The document that needs to be prepared is an invitation to tender document.

Invitation to Tender (ITT)

This refers to a document issued to a range of suppliers. It sets out the specifications for the required equipment and software and it should explore how the hardware will be used and the time and scale. The also sets out the performance criteria for the required system.

Contents of ITT:

An ITT document usually contains background information together with an indication of the purpose of the system. This includes:

1. The volume of data to be processed by the system. The complexity of the system requirements and the system interfaces should be stated.
2. The number of individuals who will want to access the computer system after installation and whether access needs to be instant or not.
3. The speed of the hardware processing required or expected.
4. Input and output systems desired.
5. The type of processing methods preferred.
6. Estimated life of the computerized system.
7. Possible upgrades or expansions anticipated.
8. Other general considerations include:
 - Contact person in the company
 - Overall financial constraints
 - The form that submission is to take.
 - Closing date for submission of tender.
 - The address to which the tender is to be sent.
 - The reference person to which the tender is to be addressed.
9. The business organization could also specify how it intends to acquire the hardware and software. Available options include:
 - Purchasing
 - Leasing
 - Renting

b) User friendly software

This refers to software that the user finds helpful, easy to learn and easy to use.

Features of user friendly software:

1. It should be relatively easy for the user to start using the software.
2. The software should be as much as possible self-contained so that the user is not forced into accessing manuals or dealing with things that should be kept outside the system.
3. The amount of effort and information required of the user to get the system to complete required tasks should be kept to a minimum.
4. The user should be able to adjust to different levels of expertise between users, as users grow in competence.
5. The use should be made to feel in control of what is going on.
6. The software should behave in a logical and consistent manner, enabling the user to reason about what is going on and apply what has been learned.

c) Expert information system

This refers to a knowledge intensive information system that captures expertise of a human in limited domains of knowledge. Expert information systems can assist decision making by asking relevant questions and explaining the reasons for adopting certain actions.

Reasons why expert information systems are not popular in business systems:

1. They are quite **narrow, shallow and brittle**. They typically perform very limited tasks that can be performed by professionals in a few minutes or hours.
2. They are **expensive** to purchase since they contain captured human expertise.
3. Expert systems **cannot handle exceptional decision making situations** which are typical of day-to-day business. For instance, CLUES, an expert system used by Countrywide Funding Corp. in Pasadena, California, USA is able to process normal loan applications with 95% accuracy but it's unreliable when faced with exceptional situations such as those involving a self-employed person or complex financial schemes. Such exceptional situations are best handled by insurance underwriters.
4. In case a poor decision is made, a business organization cannot hold the expert system accountable because it's not a person rather it's a tool. The organization can only pursue those responsible for developing the system if it was in-house developed. If it was purchased or outsourced, then the organization must have a really good case for it to hold the concerned organization responsible. However, if a manager of an organization makes a poor decision, he/she would be fully accountable. Human decision makers can be questioned regarding the success or failures of their decisions.
5. As much as expert systems provide solutions to business problems, they are **not used in isolation**. They are used together with a human decision maker who considers the advice from the expert system before giving the final decision. Thus, expert systems do not contribute to substantial cost reductions due to downsizing of staff.

d) Business continuity planning

This is a type of contingency planning that provides the ability to continue business functions through a disaster. Business continuity planning enables a quick and smooth restoration of operations after a disruptive event e.g. a fire, floods, etc

QUESTION THREE

a) Terminologies in the question:

LAN (Local Area Network)

This refers to a computer network in which computers and peripheral devices are in close proximity. Specifically a LAN is a collection of computers within a single office or building that connect to a common electronic connection commonly known as a network backbone.

Wide Area Network (WAN)

This refers to a computer network that is countrywide or world wide. It normally connects networks over a large physical area such as different buildings, towns or even countries.

Ring network configuration

In this configuration, each device is connected to the other devices in the network to form a ring.

Star network configuration

This consists of a number of small computers or peripheral devices linked to a central unit called a main hub.

(i) Company A

Since the computers are stand-alone, there is no need for network security mechanisms.

Physical measures that could be used to ensure security include:

- Use of bolting door locks at computer room entrances. These locks require the traditional metal key to gain entry.
- Use of combination door locks (cipher locks). These use a numeric keypad or dial to gain entry.
- Electronic door locks. This system uses a magnetic or embedded chip-based plastic card key or token entered into a sensor reader to gain access.
- Manual logging of visitors to the company to discourage intruders.
- Electronic logging of visitors to the company to discourage intruders.
- Identification badges (photo IDs).
- Video cameras.
- Security guards.
- Not advertising the location of computer facilities to make it hard for intruders who have already gained entry into a company's premises to locate the computer facilities.

Logical security measures that could be used to prevent unauthorized access:

- Username and password identification at each terminal to control access to microcomputer resources.
- Data stored on the stand-alone microcomputers should be encrypted so that an intruder who has already gained access to the data to be able to read data.
- Token devices, one-time passwords. This is a two-factor authentication that generates one-time passwords that are good for only one logon session.
- Biometric security access control- based on a physical feature of the user such as finger print or eye retina scan.
- Data classification- by assigning classes or levels of sensitivity to computer files, management can establish guidelines for the level of access control that should be assigned. Confidential data should be given the highest priority when being protected from unauthorized access.

(ii) Company B

The physical security procedures described for company A could be applied to company B to ensure that no one has a physical chance of tapping into the corporate LAN. The logical security procedures described for company A would still apply to company B. In addition other logical measures would be required for the corporate LAN. These include:

- Use of terminal identification files by communication software to check the authentication of a terminal when it tries to send or receive messages.
- Data encryption- to protect messages from disclosure during transmission.
- Network monitoring devices may be used to inspect activity from known or unknown users.

(iii) Company C

Again, the physical security measures described for company A could be used for company C to secure the computer facilities from physical unauthorized access. The logical security measures for company A would still hold for company C. Additional logical security procedures required would be similar to that of company B since company B's configuration

(a LAN) is similar to Cs configuration (a WAN composed of many LANs similar to Bs). Specific emphasis should be on securing data in transit as the servers are updated. An appropriate data encryption algorithm (scheme) would suffice.

(iv) Company D

The physical security measures should be similar to those of company A. The measures should be enforced in each of the twenty processing locations. The logical security measures should be similar to those of companies A, B, and C with the exception that the security system would be centralized about the head office system to make it more full proof. This is because in a star configuration, requests for data access must first be channeled to a central node in the network according to the polling media access control mechanism. The intrusion detection at the central node (head office computer server) would thus be able to monitor all system user requests.

Security procedures that should be applied:

b) Data communication systems I would recommend:

1. Modems

These would enable digital data to be transmitted over the telephone links present in company D's network configuration by converting it to an analog form and then reconvert it at the receiving end.

2. **Telecommunication links-** to provide interconnectivity between the processing locations and the head office.

3. A much **more powerful network operating software** (e.g. Linux, Unix, Windows NT) to be able to cope with the large number of users. The network operating software should also be able to support frequent updates of file servers at each location.

4. Multiplexers

They are required to combine all links from the PCs in a processing location into a telecommunication link. Multiplexors are thus needed to share telecommunication links amongst the many users.

QUESTION FOUR

a) Management control

This refers to the activity of monitoring how effectively resources are used and how well operational units are performing.

Areas of management control where computers are used/can be used:

1. At the **operational level** where transaction processing systems (computerized systems that perform and record the daily routine transactions necessary to conduct the business) could be used to coordinate accounts receivable.

2. At the **knowledge level** where office systems (systems that automate office procedures) and knowledge work systems (systems that aid knowledge workers to create new information and knowledge) may be used for electronic scheduling of events and product design.

3. At the **management level** where **INFORMATION COMMUNICATION TECHNOLOGY** (MISs- information systems at the management level of an organization that secure the functions of planning, controlling and decision making by providing routine summary and exception reports) could be used for budget preparation and in identifying production cost overruns. Also

Decision support systems (information systems at the organization's management level that combine data and sophisticated analytical models or data analysis tools to support non-routine decision making) could be used in supporting non-routine decisions such as identifying production facility locations for a manufacturing company.

4. At the **strategic level** where executive support systems (information systems at the organization's strategic level designed to address unstructured decision making through advanced graphics and communications) to support senior managers in making decisions concerning new products and new markets.

b) Two options available are: -

Centralized information system

In this option, the processing of the information is at the central location i.e. the head office. This means that data will have to be captured and taken to that location where processing is to take place. The data can be taken to the central location either by:

a) Electronic means

Here data will be transmitted electronically from different sites to the central location where processing is undertaken. These sites have to be linked to the central processing through computer networks.

b) By physical means

In this case, transaction records will be transported by physical means e.g. post or courier services to the central location where processing will take place.

Circumstances:

- Where standards have to be maintained
- Where high degree of control is required.
- Where IT experts are concentrated in one location.

Distributed processing

Here, processing takes place in many dispersed locations. A distributed system is one where there are several autonomous but interacting data stores and systems of different geographical locations that are linked through the use of computer networks.

Circumstances:

- Where there is need to meet or tailor the system to local needs.
- Where there is availability of enough experts.
- Where fault tolerance is essential. The many processing locations provide an alternative processing option should one location fail.

QUESTION FIVE

a) System analyst

This is a specialist who translates business problems and requirements into information requirements and systems, acting as liaisons between the information systems department and the rest of the organization.

System development life cycle

This is a traditional methodology for developing an information system that partitions the systems development process into formal stages that must be completed sequentially with a very formal division of labour between the end users and the information systems specialists.

Tools that may be used by the analyst to model the systems requirements:

1. Data flow diagrams (DFDs)

These are visual tools that show the various processing steps and data flow through a system. DFDs are constructed using four major components:

○ **External entities**

These are sources of data input to the system or the destinations of data from the system. The standard notation for an external entity is a square.

○ **Data stores**

They represent the stores of data within the system. Examples are computer files or databases.

○ **Process**

These are events that change the state of data fed to them. The standard notation for a process is a circle.

- **Data flows**

They are movements of data from one component to the other. The standard notation for a data flow is a unidirectional, labeled arrow

2. System flowcharts

These are diagrammatic representations that illustrate the sequence of operations performed to get the solution to a problem. They are useful in understanding the logic of complicated and lengthy problems.

3. Entity relationship models (ERMs)

They are detailed logical representations of the data for an organization or for a business area. They are expressed in terms of the entities in the business area, the relationships among the entities and the attributes of the entities and their relationships. An entity is an object of interest (i.e. a thing or concept) about which data is to be stored. An attribute is a property or characteristic of an entity.

4. Entity life history diagrams (ELHs)

These are diagrammatic representations of the lives of entities from their creation to deletion. The life of an entity is expressed as the permitted sequence of events that can cause an entity to change. An event may be thought of as whatever brings a process into action to change entities.

5. Data dictionary

This is a central storehouse of data about an information systems data and data transformations. Data dictionaries are necessary because it is impossible to fully describe all components of DFDs and E-R models. Data dictionaries describe in detail data flows, data stores, external entities, data structures, system processes and data elements.

b) (i) Graphical User Interface (GUI)

This refers to a human computer interface (HCI) based upon a graphical display. A GUI makes use of icons, buttons, bars and boxes to perform tasks.

Human Computer Interface (HCI)

This refers to the environment where the interaction between end users and the computer is said to take place.

Other interfaces that could be used in the design of systems:

1. **Command driven interfaces**- these enable the user to quickly and simply instruct the computer on what to do via commands.
2. **Menu driven interfaces**- these provide users with menus. The menus provide the user with a number of options and a simple means of selecting between them.
3. **Direct manipulation interfaces**- these present the user with a set of options that are represented by icons. The user moves the cursor using the mouse until it is over the icon and then clicks the mouse button to select the option.
4. **User Interface Management System (UIMS)**- These create a means by which a consistent interface with the same —look and feel— can be provided for any number of different applications within the same system.

(ii) Ways in which a GUI makes a system user friendly:

1. **GUIs minimize the time taken to perform trivial operations** e.g. opening a file. For instance, to open a file in the GUI environment of the windows range of operating systems one only has to double-click on the icon (graphical symbol) representing the program.
2. **One doesn't have to memorize commands** with a GUI as compared to a command-driven interface. Hence, GUIs make it very easy to learn how to use a system.

3. **GUIs minimize the typing of data required from the user** because they provide a graphical means to supplement typing of data. Hence, they are convenient to system users.
4. **It's easy to access help from a GUI** as compared to other interfaces such as command-driven interfaces. To access help, for instance, in a windows operating system environment, one only has to locate and click-on the help option in the menu bar of the **program's window**. For a command-driven interfaces such as that of Microsoft DOS(disk operating system), one has to recall the help command before he/she can access help. If the user has no clue of the help command, then he/she is stuck.

c) Reasons why more and more software is being purchased for windows environment as opposed to character-based environment.

1. The windows environment **saves on training** of users. Most software developed for the windows environment conforms to some basic standards. For instance, there are always three buttons to the top right end of each window for the purposes of minimizing, closing or maximizing the window. Usually, also, there is always a menu-bar present in all program windows to provide users with various options. Since most software applications adhere to these standards, users of windows environment software can easily learn how to use many more software after learning how to use one software. Command/character-based systems have minimal standards. For instance, there are no conventions as to the naming of commands. This makes it very difficult to learn many different programs produced for character-based environments.
2. Majority of the software today is based on a windows environment because its user friendly. Hence, customers have a **wide variety to choose from**.
3. Since majority of the software available is for the windows environment, organizations continue to purchase more and more windows-based software as compared to character-based software in order **to ensure compatibility with already existing systems**.

QUESTION SIX

a) Database system

This refers to a system composed of a group of related files.

File

This is a group of records of the same type.

Record

This refers to a group of related fields e.g. a student record may be composed of fields such as student name, student number, course, date of birth, etc

Database management system

This refers to a complex software system that constructs, expands and maintains the database. It also provides the controlled interface between the user and data in the database.

- (i) Features of a DBMS that provide data security and integrity:
 1. **Usernames and passwords**- used to prevent unauthorized
 2. **Transaction locks** i.e. write locks and read locks. Write locks prevent other processes(programs) from updating data currently being updated by a process. Read locks prevent any other processes from updating data that is currently being read by a process.
 3. **Checkpoints and journals**. A checkpoint is a **—snapshot of the database before it was updated** by processes/programs and the journal holds details of updates subsequently made. In the event of failure, the recovery process can rebuild the database from checkpoints and journals.
 4. **User rights and privileges**- access to files or fields of records could be granted depending on the user privileges.
 5. **Encryption**- coding of data by special algorithm that renders them unreadable without decryption.

Integrity checks e.g. checks on relationships amongst tables to ensure that they are valid and data validations

(ii) Data redundancy

This refers to the presence of duplicate data in multiple data files. Data redundancy occurs when different divisions, functional areas, and groups in an organization independently collect the same piece of information. For instance, within the commercial loans division of a bank, the marketing and credit information functions might collect the same customer information contained in separate files.

Problems caused by data redundancies:

1. Large storage space requirements

Since each functional area of an organization maintains the same piece of information, the resource requirements (hard disk, optical disk, magnetic tape) may be very large.

2. Problem of securing all the redundant data

Though the data in such a database is redundant, it must still be secured from unauthorized access. This task is very difficult to implement because each functional area of an organization holds the data.

3. Confusion

Since data is collected and maintained in so many different places, the same data may have different meanings in different parts of an organization. Simple data items such as the fiscal year, employee identification, and product code can take on different meanings as programmers and analysts work in isolation on different applications.

4. Difficulty in performing updates

To update a redundant data item, one must update all instances of the redundant item in all the department files of an organization. This is clearly hectic!

5. Compromised system integrity

In cases where only one instance of a redundant data item is updated, the system integrity is compromised since the other instances of the redundant data item in the rest of the organization's departments will differ from the updated instance of the redundant data item.

(iii) Precautions that should be taken into account in establishing a centralized data control system to avoid redundancy:

1. One should ensure that adequate security mechanisms are in place to ensure that users are granted access to only what they are supposed to access.
2. One should ensure that the system is fault tolerant i.e. it should be not too centralized as to be vulnerable to failure.

b) Decisions relating to an organization that may be taken by outsiders:

1. Changes in value added tax
2. Changes in materials costs
3. Change in bank account charges
4. Regulation of prices e.g. petroleum prices, matatu fares, etc
5. Regulation of bank interest rates
6. Changes in legislation e.g. changes to clauses in the Companies Act
7. Imposition of exports quotas

QUESTION SEVEN

a) Magnetic medium

This refers to a secondary storage medium that utilizes magnetism to store data. Examples include magnetic disks (hard disks and floppy disks) and magnetic tapes.

Risks to data storage on a magnetic medium:

1. **Strong magnetic fields**- these could destroy the data on the medium by altering the magnetic patterns on the media

2. **Intense heat**- this alters the magnetic patterns on the media thus destroying the data represented by those magnetic patterns.
3. **Dust**- this results in hard disk crashes and also may render floppy disks unreadable. A disk crash is a situation that arises when dust particles come into the space between a read-write head of a hard disk and the disk plate. Disk crashes render a hard disk unusable thus resulting in loss of stored data.
4. **Theft**- since magnetic media are portable, they are liable to theft. Stealing a magnetic medium device is as good as stealing the data it contains since the data stored can be accessed after the device has been installed on another terminal.

b) Anxieties about establishing a company website:

1. High costs involved

It's costly to develop a website or to outsource (pay an information technology firm to develop the website) development due to the high level of expertise required. Maintenance costs of the website would also be very high since maintenance of websites is an activity that needs to be carried out frequently. The cost of hosting the website would also have to be considered.

2. Business process reengineering

Establishing a company website may involve change of business processes. Setting up an e-commerce site may force an organization to change its business processes to foster the selling of goods and services over the Internet. Changes to business processes may encounter internal resistance from company employees or external resistance in the form of customer reluctance to comply with the change e.g. customers may be reluctant to switch from the traditional channels of doing business to the Internet.

3. Exposure of organizational information to competitors

Setting up a corporate website would mean that organizational data such as the nature of its business and the products and services offered will be available to competing businesses. Some companies are usually conservative to setting up corporate websites because the information that is displayed on the websites could be used by competitors to improve their competitive advantage.

4. Security

If the company website is hosted (contained) within the company then setting up the website would expose organizational data to security threats from the Internet. The website would also provide an avenue for hackers to access the organization's computers.

5. Training

Company staff may have to be trained on how to use the website. For instance, employees may need to be trained on how to log-on and how to access, say, their business e-mails. Training would be expensive in terms of time and costs (trainers salaries).

c) Reasons for automation of decision making roles:

1. **To achieve speed in making structured decisions** e.g. an order to restock when stock levels are low could automatically be implemented by a computerized solution to decision making.
2. By automating structured decisions, **human beings are freed to more complex structured decisions** that require creativity, which is not provided for in computers.
3. **Computers are more reliable** when it comes to making routine decisions. A human being is capable of forgetting to perform a routine decision e.g. restocking particularly when under stress. Computers on the other hand, are programmed and thus they cannot forget to perform routine tasks. Infact, they are excellent at routine tasks.
4. **A computerized solution to decision making is cheaper** than a human solution to decision making. Managerial decision makers usually offer their expertise at a high cost. A computerized solution to decision making would only involve an initial investment cost and subsequent maintenance costs which are in the long run cheaper.
5. **Objectivity**- computers are totally objective. Human beings could have other factors that may affect their reasoning (e.g. anger) which could end up compromising the decisions they make.

d) Desktop publishing (DTP)

This refers to technology that produces professional-quality documents combining output from word processors with design, graphics, and special layout features. Examples of software used for desktop publishing include PageMaker and Publisher.

Ways in which a business can use Desktop Publishing:

1. Production of brochures and flyers
2. Production of manuals for staff
3. Production of certificates
4. Production of newsletters
5. Production of calendars and diaries
6. Production of quality commodity catalogues.

QUESTION EIGHT**a) Decision support system (DSS)**

These are information systems at the organization's management level that combine data and sophisticated analytical models or data analysis tools to support decision making (specifically semi-structured and unstructured decision making).

Relevance of DSSs to management accountants:

DSSs help management accountants to make semi-structured and unstructured decisions relating to accounting.

Uses of DSSs:

DSSs assist management accountants in:

1. Evaluating planned asset acquisitions
2. Evaluating investment options
3. Controlling organizational expenditure
4. Evaluating proposed asset disposals
5. Budget planning by enabling simulation of how the budget would look like when various parts of it are altered.

b) Tasks undertaken by the systems analyst in the design phase of the information systems development process:

1. **Soliciting ideas and opinions from users, vendors and IT specialists.** Users ideas and opinions are useful in reviewing systems designs such as output designs (specifically document/form design). Vendor and IT specialist's opinions are critical when producing hardware and software specifications.
2. **Ensures adherence to internal technical design standards** e.g. program design standards that ensure completeness, usability, reliability, performance and quality of the system being developed.
3. **Design of outputs, inputs, interfaces, software and processes** for the system being developed.
4. **Participation in design reviews** in order to establish areas where improvements can be made to the system designs.
5. **Oversees the preparation of the systems specification document.**

c) Local Area Network (LAN)

This refers to a collection of computers within a single office or building that connect to a common electronic connection (network backbone).

Reasons for the success of LANs:

LANs enable faster sending/receiving of data and information.

Since the movement of data and information is electronic, the sending and receiving of data and information over the LAN is almost instantaneous.

LANs eliminate bottlenecks

Without a LAN, the sending/receiving of data and information contained in documents is usually through a 3rd party responsible for delivering the documents to the intended recipient

department. At the recipient department the documents also have to be sorted out before being delivered to the intended employees LANs eliminate the bottleneck of a 3rd party since an

SUGGESTED SOLUTIONS TO DECEMBER 2011

QUESTION ONE

a) (i) Administrative controls that need to be implemented:

1. USE OF COMPETENT PERSONNEL

This reduces the risk of data being lost or equipment being damaged due to incompetence.

2. ROTATION AND DIVISION OF LABOUR

Network control functions should be separated and duties rotated on a regular basis.

Division of labour ensures that the network control is performed effectively. Rotation of duties reduces the risk of sabotage by staff members since such an attempt would require that the staff member be in charge of the given duties for a considerable period of time.

3. AUDIT TRAIL REVIEW

Audit trails should be reviewed periodically by operations management to detect any unauthorized network operation activities.

4. DOCUMENTATION AND REVIEW OF STANDARDS

Network operation standards and protocols should be documented and made available to the operators and should be reviewed periodically to ensure compliance.

5. MONITORING

Network access should be closely monitored and reviewed by system engineers to detect unauthorized access.

(ii) Techniques used to secure e-mail messages:

1. DATA ENCRYPTION

The e-mail messages could be encrypted (converted into a coded form) by a code before being sent. At the receiver's end, the messages are decrypted before being read. This technique would prevent eavesdropping.

2. DIGITAL SIGNATURES

This works together with the principle of data encryption to guarantee authenticity of e-mail messages and thus avoid falsified sender's identities. The sender adds a digital signature to the message being sent. A digital signature is issued by certificate authorities which certify the credibility of an individual communicating over the Internet. Digital signatures thus provide assurance that the sender of a message is really who he claims to be.

o Policy issues

Antivirus software should be installed on all the computers on the network to detect and cleanout viruses.

Floppy disk drives could be disabled to reduce the risk of viruses being brought to the computer through diskettes.

Have vendors run demonstrations on their machines and not the company's machines.

Allow no disk to be used until it has been scanned on a stand-alone machine that is used for no other purpose and is not connected to your network.

Update virus software scanning definitions frequently.

Write protect all diskettes with .EXE or .COM extensions.

Enforce a rule of not using software without first scanning the shareware thoroughly for a virus.

Scan any new commercial software before it is installed since commercial software is occasionally supplied with a Trojan horse.

Create a special master boot record that makes the hard disk inaccessible when booting from a diskette or CD-ROM. This ensures that the diskette or optical media cannot contaminate the hard disk.

b) (i) System analysis

This is the in-depth study of the problem that the company intending to automate its sales department will try to solve with an information system. It consists in defining the problem, identifying its causes, specifying the solution and identifying the requirements that must be met by a system solution.

(ii) Main objectives of systems analysis:

1. To determine information needs of an organization and the users of that information.
2. Determination of the current activities of the system i.e. functions involved in conversion of inputs to outputs.
3. Determination of the intended system's outputs.
4. Determination of the resources required for the intended system.
5. Determination of capabilities required in the system to meet the information needs of the organization.

(iii) Personnel and their tasks:

1. SALES CLERKS

They would help in determining the current activities of the system by identifying the functions involved in the conversion of inputs to outputs.

2. SALES DEPARTMENT MANAGER

He/She would help in determining the intended system's outputs by specifying the kind of reports he would desire from the automated information system. He/She would also assist in determining the information needs of the company and the other users (especially managers) of the information.

3. SYSTEMS ANALYST

He/She oversees the running of the system analysis. He/She liaises with the end users i.e. the clerks and the sales department manager to establish the current activities of the system, the information needs of the organization, the intended systems outputs, the resources required for the intended system and the capabilities required in the intended system in order to meet the information needs of the organization. The systems analyst also prepares and presents to management the feasibility study report which details the current situation and the way forward.

QUESTION TWO

a)(i) Benefits of replicating or distributing databases to various sites:

1. Reduction Of System Vulnerability

When the central database is duplicated at various sites, the system vulnerability to failure is reduced because the system is more fault tolerant due to the replication at various sites.

2. Increased Service And Responsiveness To Local Users

Since the data is held locally at the various sites, data retrieval and processing is fast for local transactions.

3. Reduction In Hardware Costs

Distributed systems usually run on small less expensive computers which are far much cheaper than the mainframes required for a centralized system.

4. Easy Management Of Local Transactions

With partitioned distributed databases each location has its own unique records which makes updating and searching very easy since only the local database in question is involved.

Challenges:

1. Vulnerability Of The Distributed System To The Communication Links

Distributed systems are usually reliant on high-quality telecommunication lines which themselves are vulnerable (e.g. to sabotage, equipment failure, etc)

2. Management And Coordination Of Transactions

Distributed systems make it possible for many processes to share data from one database. These challenges arise in ensuring that there are no transaction deadlocks and in ensuring that updates to records are well coordinated.

3. Security

Distributed database systems pose a security challenge because they widely distribute access to sensitive data. For such systems, complex security mechanisms have to be included in their design.

4. Harmonizing of Data Standard and Definitions

Distributed databases systems pose the challenge of ensuring that local databases adhere to central data standards and definitions.

b) Factors that influence an organization's decision to distribute or not to distribute data:

1. Transition Costs

The cost of moving from a centralized to a distributed database environment largely determines an organization's decision to distribute its databases. Where such costs are high, there have to be substantial benefits to be derived from decentralizing or else an organization chooses to remain centralized.

2. Size of The Organization

Large-scale organizations are most suitable for and tend to benefit the most from distributed database systems. Such organizations usually cover large geographical areas and can thus distribute the database amongst several locations. Small-scale organizations are most suitable for centralized database systems. Usually such organizations don't cover a large geographical area and thus there is no need to distribute the company's database.

3. Security

Distributed database systems pose security problems because they widely distribute access to sensitive data. Centralized database systems on the other hand, pose fewer security risks and thus they may be favoured by an organization.

4. Fault Tolerance of The Current System

If the current system is vulnerable to system failure, then an organization will tend to distribute the system's data so as to reduce the system's vulnerability and thus increase its fault tolerance.

5. Ease of Management of the Current or Intended Database System

If the organization finds it easier to administer security, manage database updates and carry out backup of data on a centralized database then it's likely to maintain that setup.

However, if the organization could cope with the extra challenge of administering security, managing updates and carrying out backup of data on a data that is distributed then it could consider distributing its data.

6. Nature of the Database Transactions

Real-time transactions may require a centralized system which only has one view of the database as compared to distributed systems which have a local view and a holistic view of the entire distributed database system. Where such views differ due to a pending update on the central database, then the integrity of the data held is compromised and thus the transaction integrity is also compromised.

b) **Hardware:**

Measures:

- a Use of bolting door locks on doors leading to computer rooms
- b Use of combination door locks in computer rooms
- c Manual logging of all visitors to a company
- d Biometric door locks for computer rooms
- e Electronic logging for biometric and electronic access systems
- f Video cameras
- g Security guards
- h Bonded personnel – all service contract personnel such as cleaning people and off-site storage devices should be bonded to limit the financial exposure of the organization.

9. Not advertising the location of sensitive facilities such as computer rooms. The building or department directory should only identify the general location of the information sharing facility.
10. Computer terminal locks, which lock the device to the desk, prevent the computer from being turned on or disengage keyboard recognition preventing use.
11. Controlled single entry point- controlled entry point monitored by a receptionist should be used by all incoming personnel. Multiple entry points increase the risk of unauthorized entry. Unnecessary or unused entry points should be eliminated or deadlocked.

Database Management Systems

Measures:

1. Usernames and passwords to prevent unauthorized access.
2. Encryption of database contents.
3. User rights and privileges- rights to update a company's database should be given only to staff who need to e.g. accountants when updating accounts records and personnel department staff when updating employee records.
4. Locking of open records to prevent multiple updates on the records.

Operating systems

Measures:

1. Usernames and passwords.
2. User rights and privileges- these provide a limit to the actions that are permitted by a user e.g. a user may only be allowed to read, write and update his files but may not be allowed to read, write and update the files of another user on the same computer.
3. Audit trails
4. Data encryption

QUESTION THREE

- a) (i) Hardware and software must be compatible for the computer system to function. Thus, it's important to evaluate the software vendors to see whether their products are compatible with those offered by hardware vendors.

(ii) Criteria used in deciding between the various vendors:

1. **Benchmark tests**- test how long it takes for a machine to run through a particular set of programs. It's carried out to compare performance of software/hardware against present criteria such as performance speed, response times and user friendliness of equipment.
2. **Simulation tests**- they use a synthetic program written specifically for testing purposes. They are programs incorporated with routines designed to test a variety of situations.
3. **Supplier's reliability**- both financial stability and track record
4. **Cost**- equipment cost, installation cost and training costs.
5. Utility software supported and preloaded in hardware.
6. The warrant period, units and maintenance commitments.
7. Software support upgrades and maintenance.
8. Training requirements which includes timings, number of personnel, etc

- b) **Downsizing**- process of transferring applications from large computers to smaller ones.

Ways in which managers can take advantage of downsizing in computer technology:

1. Reduction in computing costs

Downsizing promotes the use of PCs which are cheap in terms of memory and processing power as compared to mainframes.

2. Reduction in labour costs

The PC environment promoted by the downsizing concept is end-user friendly and doesn't require experienced computer operators as compared to the mainframe environment. This implies a reduction in the need for technical staff members.

3. Improved system and organizational efficiency

Downsizing promotes the concept of distributed processing which improves the efficiency of small local operations since the work is shared out amongst various processing terminals. The end result is overall organizational efficiency.

c) Benefits of using 4GLs:

Fourth-generation language:

This is a programming language that can be employed directly by end-users or less skilled programmers to develop computer applications more rapidly than conventional programming languages. Fourth generation language features/tools include: PC software tools, query languages, report generators, graphics languages, application generators, application software packages and very high programming languages. The benefits of using fourth generation languages include:

1. Easy To Use

Because of their non-procedural nature most of 4GL features are easy to use for the end user e.g. with query languages, the user only has to specify the data that needs to be accessed. He doesn't have to specify how it is to be accessed.

2. Short Application Development Time

Because of their relative ease of use as compared to conventional programming languages, 4GLs reduce application development time.

3. 4GLS Suit Any Category Of User

End users can utilize PC software tools, query languages and report generators which form the simple 4GL features while IS professionals could benefit from graphics languages, application generators and very high-level programming languages which are more technical and are suited for developing entire applications.

4. Availability of Support/Advice

4GLs are very common in modern day programming and hence it's easy to find people who have experience in using 4GL features. Such experienced users may be sought after for advice.

5. Customized Software

4GL enable end users to develop their own systems and thus they are able to implement all their requirements since it is only they who understand their requirements better. Thus 4GLs result in fully custom-built software which thus improves productivity.

d) Features of a Visual display unit:

1. The VDU is really 2 devices: A keyboard and a screen display. The keyboard is used for data input while the screen display is used for output of data.
2. Data is fed in via a keyboard which is like a typewriter keyboard, and is both passed into the computer and displayed on the screen. The VDU can also receive and display messages from the computer.
3. VDUs are normally used by connecting them directly to the computer. This mode is known as on-line data entry.
4. Used in the past in conjunction with some other special purposed data entry system in order to prepare data on a fast and reliable input medium. The most popular was the key-to-floppy-disk or key-to-diskette system. These were basically micro-computer-based systems that took in data from the VDU and stored it on floppy disks.

QUESTION FOUR

a) (i) **Testing**

This refers to the process of uncovering errors in programs thus enabling them to be rectified.

Issues that are likely to cause system failure:

1. Poor test data

This may result in errors going undetected thus resulting in a system full of undetected errors.

2. Poor planning

Lack of a testing strategy could result in too little time being allocated to testing thus resulting in incomplete testing. A poorly tested system would thus be liable to failure.

3. Lack of cooperation from end users in producing test cases

This would result in poor test data and hence a poor system.

4. Bias towards certain system aspects and neglect of other system aspects

Neglect of system modules during testing could compromise the quality of the system thus making it liable to failure.

(ii) Project definition

This refers to the process of identifying an information systems problem and selection of a solution in the form of a project to solve the information system problem. Project definition also involves planning for the initial stages of the project.

Issues likely to cause system failure: 1.

Selection of an unsuitable project

A project may be unsuitable because it doesn't add value to an organization. Such a project may produce a failure of a system since it will fail in accomplishing the strategic aim of any organization of having a favourable competitive advantage.

2. Poor project planning

This may result in a project not being allocated adequate resources thus resulting in a poor system which is liable to fail.

(iii) Design

This refers to the process of transforming system requirements into a form that can be implemented to produce a working system.

Issues that are likely to cause system failure:

1. **Poor design specifications**- likely to result in a low quality system being developed.

2. **Inadequate time for design**- results in quality of design specifications being compromised hence compromising the quality of the developed system.

3. **Poor systems requirements specifications**- likely to influence the quality of the design specifications since the design specification is produced from the requirements specification. The end result is a poor quality system.

(iv) Requirements analysis

This refers to the process of determining the system requirements for a system to be developed.

Issues that are likely to cause system failure

1. **Poor cooperation from end users**- results in scanty system requirements which result in a 'half baked' system.

2. **Poor cooperation from management**- also results in a poor requirements specification which compromises the quality of the developed system.

3. **Short allocated time**- this forces the IS development staff to rush through the requirements analysis stage and thus produce a sketchy requirements specification. The end result is a poor quality system.

4. **Inadequate funding**- poor funding for information gathering activities such as questionnaires may prove a bottleneck in the requirements analysis process thus resulting in a poor requirements specification.

b) Factors that may contribute or influence a management information needs:

1. The Level Of Management

That is, whether its tactical, operational or strategic. An operational manager would require solely internal data concerning the organization's transactions or operations while a strategic manager would require both internal and external data for strategic decision making.

2. The Nature of The Management Decisions

For example, for an operational manager, a decision to restock would need stock level information; a decision to step-up the production output would require the current and planned production levels.

3. The Frequency of Decision Making

Operational decision making is carried out frequently thus it needs a frequent supply of information. Strategic decision making is non-routine and thus its information need is adhoc.

4. The Nature of an Organization

This influences information needs at all the levels of management.

5. Presence of Fierce Competitors in the Market

This would force an organization to constantly gather information about the organization's competitors in order to formulate new competitive strategies or strengthen existing ones.

QUESTION FIVE

a) Members of staff and their corresponding tasks:

(i) System end users

They provide feedback to the IT staff and management concerning the current system. That is:

- Whether there are delays in processing and the effects of such delays.
- Whether the system requires more staff to handle the workload
- Error rates for input data
- Output i.e. whether it is correct, timely and distributed correctly to the relevant users. IT staff and management can thus act on the feedback provided by end users and perform an appropriate system upgrade.

(ii) System users

They work with the end users to identify areas of the current system that need to be upgraded.

(iii) Management representatives

They help to establish whether the system is accomplishing its operational, tactical and strategic objectives and thus justify the need for an upgrade. They also provide approval before system upgrade can take place.

(iv) IT department staff:

They include:

1. IT manager

- He is in charge of heading the system upgrade exercise
- Justifies the need for upgrade to senior level management by preparing and presenting a post implementation review report.

2. Programmers

They are needed when the upgrade involves modifying the system's software.

b) Reasons why IT is considered as a strategic resource:

1. Cost control

It enables an organization to cut down long-term costs. It enables automation of business processes which cuts down on labour costs.

2. Product and service differentiation

It enables product and service differentiation through design software thus enabling an organization to compete favourably in future.

3. It improves a company's corporate image

IT enables effective advertising via the Internet which enhances a company's corporate image.

4. Globalization

IT enables an organization to globalize. The Internet provides organizations with an opportunity to tap foreign markets.

5. It improves planning

Planning and scheduling software may be used by managers to improve the quality of an organization's strategic plans.

6. It enables customer „lock-in“

IT could be used to lock-in customers thus preventing them from moving to other competitors by introducing switching costs (e.g. cost of changing telecommunications links, costs of buying new hardware and software, etc)

c) Standard files

These independent files which are maintained for a unique purpose by the various functional components of an organization e.g. an employees file may be maintained by the human resources department to hold employee records. Various standard files may contain the same data e.g. employee name and employee number may be contained in the employees file and also in the pensions file. This situation is referred to as data redundancy. Standard files are being phased out by the database approach to filing which creates interrelationships amongst files to reduce the amount of data that is duplicated.

Problems encountered when using standard files for data processing systems:

1. Data redundancy and confusion

When many files hold the same data a lot of filing space is wasted storing duplicate data. It is also difficult to know which file contains the correct version of the data since the versions of the data contained may differ due to incomplete or omitted updates.

2. Program-data dependence

When each program has its own file, problems arise when changes have to be made to the data in the files. In such a case, changes also have to be made to the programs accessing the data. This process may be lengthy and costly to an organization because of the expertise required.

3. Poor Security

It is difficult to administer security over each individual file maintained by an organization as compared to administering security over a system of related files.

4. Lack of data sharing and availability

Standard files do not facilitate data sharing since each application maintains its own file.

QUESTION SIX

a) Circumstances:

1. Common systems development methodology being used e.g. Structured

Systems Analysis and Design Methodology (SSADM), Rapid Application Development (RAD) CASE tools ensure that all standards related to a given methodology are adhered to thus guaranteeing software quality.

2. Group working

CASE tools organize and correlate group design components and provide rapid access to them via a design repository.

3. Complex graphic features required in the system

CASE tools provide facilities for generating complex screen designs and implementing the designs through code.

4. System composed of many program modules

CASE tools automate code generation thus reducing systems development time.

5. High degree of systems reliability a must

CASE tools provide facilities for rigorous testing thus guaranteeing high systems reliability.

6. Systems analysis and design is tedious and error prone

CASE tools automate the tedious and error prone portions of systems analysis and design thus reducing the time spent on systems analysis and design and hence the overall systems development time is reduced.

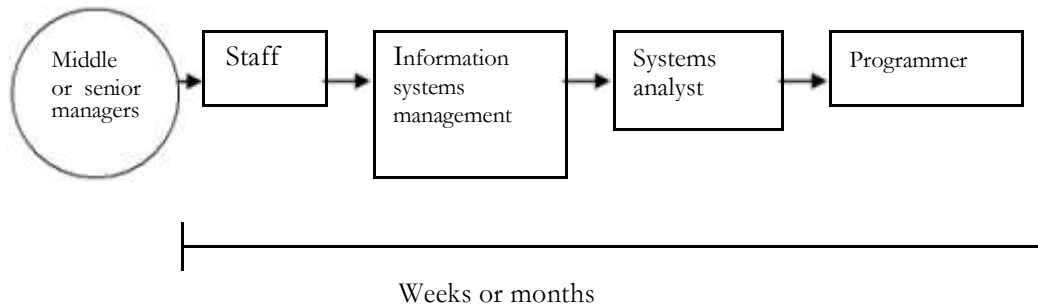
b) End user computing

This refers to an approach to systems development where some types of information systems can be developed by end users with little or no formal assistance from technical specialists. Using 4th generation languages and PC software tools, end users can access data, create reports and develop entire information systems on their own, with little or no help from professional systems analysts or programmers.

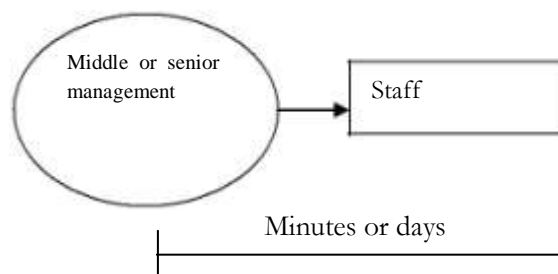
Impact on the organization of IT functions:

End user computing has in most cases eliminated the role played by systems analysts and programmers as shown in the diagram below.

Traditional systems (lifecycle) development



End user computing



End user computing has reduced the systems analysts and programmers roles to advisory roles. The systems analyst and the programmers may participate in the creation of new systems by only advising the end user on technical aspects e.g. report generation and complex query formation.

c) (i) Writable/recoverable CDs

CD (compact disk)

This refers to a storage media which utilizes laser technology to store massive quantities of data in a highly compact form.

Writable/recoverable CDs are a form of CDs which allow users to rewrite data on the CDs several times. They are useful when data to be stored on the disk is subject to occasional updates.

(ii) DVDs

This stands for digital video disks or digital versatile disks. This is a high capacity optical (i.e. utilizes laser technology) storage medium that can store full-length videos and large amounts of data. DVDs are used for storing movies, music, encyclopedias, books, etc

QUESTION SEVEN

a) Electronic business

This is the use of the Internet and other digital technology for organizational communication and coordination and the management of the firm. Intranets are quickly becoming the technology of choice for electronic business.

Opportunities offered:

1. Cost Reduction

Intranets provide an opportunity for reduction of costs associated with handling and storing information. Since the information is stored electronically, there is minimal need for paper-based systems which involve paper, printing and distribution costs.

2. Training Of Organizational Staff

Internet and intranet networks enable organizations to train their staff effectively. Training could be through audio-visual programs contained in a company's intranet or through videoconferencing (ability to confer with a group of people simultaneously using telephone or e-mail group communication software)

3. Improved Group Collaboration

This is due to better intra-organizational communication facilitated by Internet and intranet technologies such as e-mail.

4. Up-To-Date Online Information Repositories

Product catalogs, employee handbooks, telephone directories or employee benefits information could be stored online in a company's intranet and could be revised immediately as any changes occur. This approach enables organizations to respond more rapidly to changing conditions.

5. Production Control

Intranets could be used to deliver financial information to manufacturing personnel so that workers can monitor the production line's profit-and-loss performance and adapt accordingly. The intranet can also be used to provide quality measurements such as defects and rejects as well as maintenance and training schedules.

6. Improved Customer Service

Up-to-date organizational information, improved group working and production control has the overall effect of improving the quality of goods and services offered to consumers.

Challenges:

1. Cost Of Changing To E-Business

Since e-business requires the use of the Internet and related digital technologies, a company intending to implement e-business would have to consider internet connection costs, costs associated with setting up and maintaining an intranet, etc. Such costs have to be clearly justified by the potential benefits to be delivered.

2. Security And Privacy

Connecting to the Internet or setting up an intranet for e-business would imply that adequate security checks have to be put in place to protect the organization's data.

3. Business Process Change Requirements

Setting up an intranet to provide access to shared organizational data would imply that the document flow of the organization would have to be modified to take into account the central shared repository of data.

4. Employee Resistance To Change

This could delay implementation of the e-business project since resistance has to be addressed before implementation.

b) Applications:

1. Storing customer records.
2. Updating customer records.
3. Producing reports e.g. a report of customers with outstanding balances.
4. Adding new customers to the database.
5. Deleting deceased customers from the database.

c) Reports resulting from information system reviews:

1. **Performance evaluation reports**- compares the predicted and actual performance of the new system and outlines whether the new system is meeting user requirements.
2. **Staffing reports**- this outlines whether staff needs are being met.

3. **Security evaluation report-** contains information on the effectiveness of the security procedures of the system.
4. **Error evaluation report-** contains information on how the system is operating, on the input errors and errors in the system outputs.

QUESTION EIGHT

a) (i) Properties of accounting functions:

1. They involve arithmetic

Maintaining records of cash receipts, cash payments, depreciation of fixed assets and employee payroll involves addition, subtraction and even calculating percentages of values (particularly in the case of depreciation and payroll records). Computers can be used to perform these arithmetical procedures since they are very fast and accurate.

2. They involve storage of information

Computers may be used to store records of cash receipts and payments, records of depreciation of fixed assets and employee payroll records since they can store very large amounts of data in very compact media as compared to the traditional filing system.

3. They are repetitive

Maintaining depreciation of records involves performing repetitive calculations on data (reducing balance depreciation). A computer, which is faster and more accurate, could best perform this repetitive task. Credit and debiting of accounts is also a repetitive task that is carried out frequently.

4. They involve production of reports (e.g. Balance sheet, profit and loss a/c)

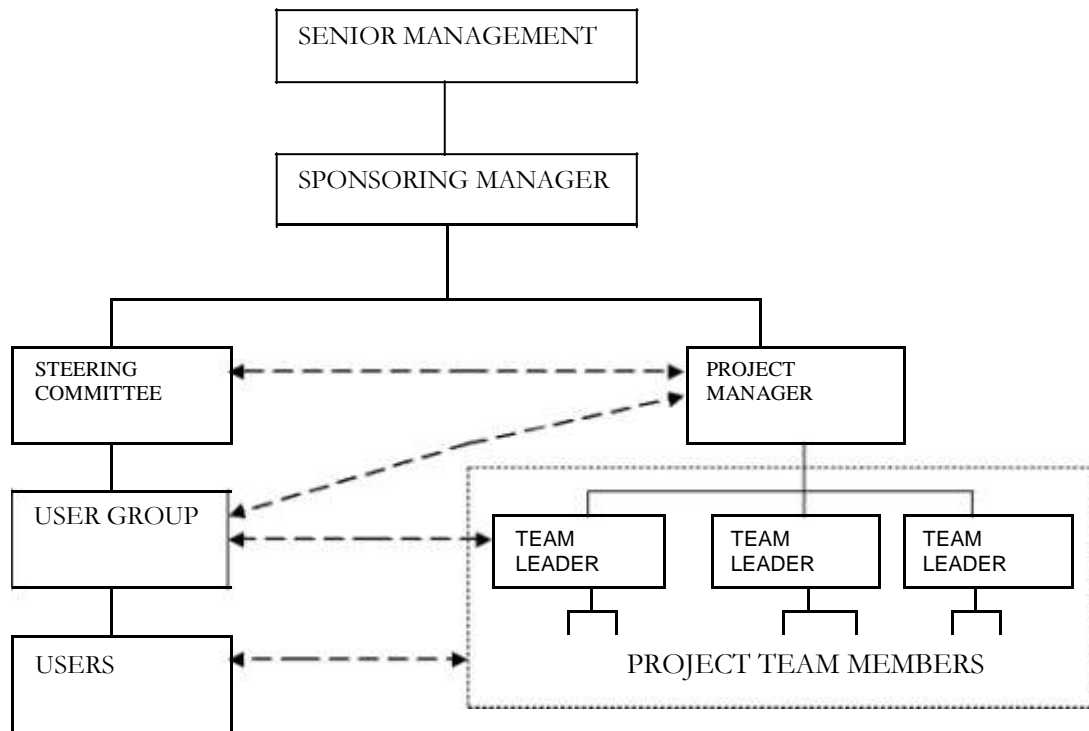
Report generation and production could be computerized since computers are capable of producing quality reports.

Accounting functions that can be computerized:

1. Managing and maintaining records of receipts of cash.
2. Managing and maintaining records of cash payments.
3. Managing and maintaining records of depreciation of an organization's fixed assets.
4. Managing and maintaining employee payroll records.
5. Production of financial statements e.g. balance sheets, trial balance, trading and profit and loss accounts.

b) Project steering committee membership comprises of representatives from user departments who are also members of the user group, some or all the project team leaders, the project manager and members of the senior management who are either responsible for the systems development staff or the functional areas primarily affected by the developments in progress.

The project steering committee fits in the project management structure as shown in the following diagram:



Functions of the steering committee:

1. Providing a forum for the discussion of user concerns, where alternative solutions may be discussed at a more senior level with a view to providing recommended sources of action.
2. Reviewing the current status of the project by reference to the dimensions of time, resources, costs and quality.
3. Analyzing the cause and effect of any deviations from the plan and evaluating alternative corrective actions.
4. Recommending changes to the project either to correct current or anticipated deviations or to reflect developments in the user's requirements from the system(s).
5. Providing advice on policy formulation for the operation of the information system within the organization at the strategic management and operational levels.

Although the steering committee's function is normally to provide advice, the committee may have real power and be able to persuade the executive arm of the management to adopt its recommendations. This is particularly the case if the members of the senior management responsible for taking ultimate decisions participate fully in the work and meetings of the committee.

c) Systems walkthrough

This is a planned review of the system under development by people not involved in its development effort. It is carried out to establish areas where improvement can be made in the system or its development process.

Areas of interest:

1. System requirements

They are reviewed to check if there are any discrepancies between the requirements stated by the users and those proposed by the systems analyst.

2. Systems designs

They are reviewed to check whether the proposed designs conform to the requirements of the system and user.

3. System programs

They are checked to establish whether the programs being developed satisfy the design specifications.

4. System testing

The review aims to develop test data that can be used to direct system design errors.

SUGGESTED SOLUTIONS TO JUNE 2012

QUESTION ONE

A) (I) ONLINE ELECTRONIC BANKING

This refers to a computerized banking system that enables customers to do most of their banking transactions via home computers linked to proprietary networks or the internet.

Services to be decentralized:

1. Receipt of balance enquiries and reply to these enquiries in the form of balance slips. Software could be designed handle these enquiries thus eliminating the need for an over the counter service. The enquiries could thus be made from a remote computer linked to the bank's central computer containing the customer database and the replies to these enquiries sent via the network linking the bank's computers to the remote computer.

2. Receipt of requests for bank statements and replies to such requests.

Software could also be designed to handle these enquiries thus eliminating the need for an over the counter service. Such enquiries could be made from a remote computer linked to the bank's central computer containing the customer's database. Replies could be forwarded via the network to the remote computer.

3. Receipt of foreign exchange rates enquiries and replies to such enquiries

Again, software could be designed to handle these enquiries thus eliminating the need for an over the counter service. Such enquiries could thus be made from a remote computer linked to the bank's central computer containing the exchange rates file.

4. Receipt of simple enquiries as to the type of accounts offered by Kenfin ltd and the reply to such enquiries. Software could also be designed to handle these enquiries thus eliminating the need for an over the counter service. Enquiries could thus be made from a remote computer linked to the bank's central computer containing the file that describes the types of accounts offered by the bank.

5. Receipt of simple enquiries regarding the types of loans offered by Kenfin ltd and the reply to these enquiries. Software could also be designed to handle these enquiries. The enquiries could thus be made from a remote computer linked to the bank's central computer containing the loan types file.

To be centralized:

1. Complex loan enquiries

Such enquiries warrant the advice of a personal banker since it is difficult to design software to respond to such enquiries. Hence, such a service should be centralized at the bank's branches where personal bankers are available.

2. Complex account opening enquiries

Such enquiries may include questions concerning the possibility of opening multiple accounts. Such enquiries are best dealt with by a personal banker and thus they are restricted to the bank's branches meaning that they must be centralized.

3. Cash and cheque depositing

This service should be centralized for convenience on the part of the bank. It could be decentralized where such deposits would have to be mailed but this would imply that there have to be security checks in the mailing processes, which at current are not present in Kenya's post system. Decentralization would mean that the mailing of cash and cheque deposits must be reliable in terms of speed in order to ensure that transactions are updated on time. Reliability in terms of speed comes at a cost that must be incurred by the bank. Since Kenfin is a medium-sized bank, it would not be able to cope with such a system.

(ii) Risks that may affect the duration and/or cost of the project.

1. Changing equipment costs

Changing costs of hardware and software equipment required by the project could increase the cost of the project beyond the budgeted level.

2. Insufficient funds- this could lengthen the duration of a project since an organization would have to wait until it has adequate funds before it can resume the project.**3. Poor planning-** Poor plans may delay a project since time will be spent reformulating the plans to meet the organization's objectives. Poor plans may also result in over expenditure as management may abandon unrealistic budgets and spend freely.**4. Poor management commitment to the project.**

Management's lack of commitment shown by their absence during meeting and reluctance to provide funding to project phases could delay a project beyond implementation time.

5. Unhappy members of the project team. An unhappy team has low motivation to work and consequently deadlines may not be met on time resulting in project delays.

b) How a software developer can make use of the Internet:

1. The Internet as a source of program code

The software developer could source code needed for specific parts of a program being developed from the Internet. For instance, a programmer could source code used for implementing a username and password security system for a specific application such as a payroll application. This would thus save the developer time in coding.

2. Expertise from programming websites

A software developer could join programming groups in websites such as programmersheaven.com for free and thus get an opportunity to share ideas and exchange advice on software development issues.

3. The software developer could also view software similar to the one he/she intends to/is developing via the Internet. Usually most software for sale over the Internet is provided for free or at a low cost for trial. The software developer could thus register for these software trials in order to see how the software implements the functions it's supposed to carry out. The software developer could thus use the ideas in developing his/her own software.**4. Internet as a platform for testing software.**

Once the software developer has finished creating a program he/she could make it available over the Internet for free at a low cost for other Internet users to test it. Through the feedback received, he/she could modify the software so as to improve its accuracy, usability, and reliability. The only downside of this approach is that by making the software available on the Internet, the developer is exposing his/her originality to unscrupulous programmers.

5. Internet as a tool for communication.

Software developers working in groups could greatly benefit from the Internet through the concept of groupware. The software developers could be in constant communication via groupware such as Microsoft Outlook which provides chat services through Microsoft Net meeting and e-mail services which could greatly boost communication and hence productivity of the software developers.

QUESTION TWO**a) Management accounting system**

This refers to an information system that enables the planning, organizing, and monitoring and control of decisions of the accounting function of an organization to be executed.

Types of decisions that can be supported by a management accounting information system and the type of accounting information required to support each decision:

1. Controlling organizational expenditure

Budgeted amounts for an elapsed period and the actual amounts spent during the elapsed period are required to support this type of decision.

2. Investing excess funds

Information on returns on various investment options, which is produced by simulation of many business scenarios, is required to support this type of decision.

3. Borrowing funds in order to meet an organization's cash needs in periods of insufficient cash flow.

Credit status forecasts produced from simulating the current and future business conditions can support this decision.

4. Acquiring new assets (e.g. IT resources, buildings, etc)

Net present values, internal rate of returns and payback periods are required to support this decision.

5. Disposal of plant assets during a fiscal year

The Net Present Values of the assets at the end of the fiscal year in question could be used to support this type of decision.

b) Fourth generation language:

This refers to a programming language that can be employed directly by end users or less-skilled programmers to develop computer applications more rapidly than conventional programming languages. Some features of 4GLs include:

1. **Prototyping** - a systems development technique that uses software in a package of forms and screen painters, to allow the user to quickly produce a simulation of the output required from the finished system
2. **Query languages**- 4GL tools which may be used in conjunction with a DBMS to enter, update and retrieve information without having to use conventional programs
3. **Report generators** - 4GL tools that augment the features of a query language with the ability to format a management report with headings, sections and totals
4. **Application generators** - 4GL tools that allow the creation of complete application programs. The degree of sophistication of these programs may vary from an end user setting up a program to accept data and produce business graphics, to a more sophisticated programmer creating software capable of sophisticated file management and transaction processing.

1st alternative: Support the statement. Backing grounds:

1. 4GLs support development by prototyping which results in software being developed in a short time since user requirements can be quickly clarified with this approach.
2. Query languages enable end users to quickly update and retrieve information without having to use conventional programs thus reducing the delay in applications development.
3. Report generators such as Oracle report writer enable end users to quickly create and format management reports with headings, sections and totals thus reducing application development time.
4. Application generators enable the speedy creation of complete application programs in a 4GL thus reducing application development time.
5. 4GLs enable the creation of INFORMATION COMMUNICATION TECHNOLOGY via query languages, report generators and application generators. Such information systems are capable of producing periodic, exception and adhoc reports which make information freely and readily available to managers for the purpose of decision making.

2nd alternative answer: Disapprove the statement Backing grounds:

1. End users using a 4GL or 4GL tool still require some training on the various features of 4GLs and hence there is a significant amount of systems development time spent on training. These delays in applications development may be significant.

2. Prototyping is a feature of 4GLs doesn't necessarily imply short development time since the process of iteration of changes to the system being developed may be long before an acceptable system is delivered to the user.
3. In cases whereby the prototype is coded in a high-level language after acceptance by the end-user, considerable development time is spent coding the prototype.
4. Reports that are produced by 4GL tools are only available to those end users who are capable of manipulating queries to produce desired reports. Such an end-user needs to be trained on formation of queries. Thus it can be argued that 4GLs do not make information freely and readily available to everyone. They only make information freely and readily available to trained users.

c) Factors affecting an organization's approach to systems conversion:

1. The nature of the system

When the new system is small and simple then direct changeover approach is favoured.

2. Differences between the old and the new system

When the old and new systems are substantially different then direct changeover approach is favoured. When the old and new systems have similar aspects then phased or parallel changeover could be used.

3. The size of the organization's labour force

When there is no extra staff to oversee or undertake parallel running of both systems then direct changeover is favoured.

4. Level of management's confidence in the new system.

When the management has complete confidence that the new system will work, then direct changeover is used.

5. Organization size

When the size of the organization is large, it could carry out pilot changeover in combination with direct, parallel or phased changeover.

d) Source code

This consists of a program in high-level language (i.e. English-like statements) before translation into machine code (statements are coded in the digits 1 and 0).

Object code

This consists of a program in machine language after translation from a high-level language by use of a compiler.

QUESTION THREE

a) Key features of a VDU terminal:

1. The VDU is really 2 devices: A keyboard and a screen display. The keyboard is for data input while the screen display is for output of data.
2. Data is fed in via a keyboard which is like a typewriter keyboard, and is both passed into the computer and displayed on the screen. The VDU can also receive and display messages from the computer.
3. VDUs are mainly used by connecting them directly to the computer. This mode is known as **on-line data entry**.
4. VDUs lack the processing capabilities of PCs and thus they are referred to as **dumbterminals**.
5. VDUs were used in the past in conjunction with some other special purpose data entry system in order to prepare data on a fast and reliable input medium. The most popular example was the key-to-floppy-disk or key-to-diskette system. These were basically microcomputer-based systems that took in data from the VDU and stored it on floppy disk.
6. When the VDU is used to provide a graphics display capacity e.g. for INFORMATION COMMUNICATION TECHNOLOGY applications, some or all of the following control devices may be incorporated in addition to the high-definition colour monitor:
 - **Mouse or trackball devices**

These use the rolling motion of a ball (a mouse by being rolled on a flat surface, a trackball by being moved manually) to act as a cursor control or to move data about the screen quickly.

- **Voice Data Entry (VDE)**

These employ a modified VDU and microphone to accept vocal input. The simplest speech recognition systems may be programmed to recognize a limited number of key words.

- **Light pen and touch screen inputs**

These use the VDU screen as part of the input medium. A light pen connected to the terminal is placed against the screen, and a light sensitive device recognizes the position by X and Y coordinates. A touch screen uses an inlaid screen to accept input through the act of physically touching the screen.

b) Internal control procedures:

1. **Manual recalculations**- a sample of transactions may be recalculated manually to ensure that processing is accomplishing the anticipated task.
2. **Editing**- an edit check is a program instruction or a subroutine that tests for accurate, complete and valid input and updates in an application.
3. **Programmed controls**- software can be used to detect and initiate corrective action for errors in data and processing. For example, if the incorrect file or file version is provided for processing, the application program could display messages instructing that the proper file and version be used.
4. **Exception reporting**- an exception report is generated by a program that identifies transactions or data that appear to be incorrect. These items may be outside a predetermined range or may not conform to specified criteria.
5. **Sequence checking on data inputs**- any control number out of sequence or duplicated are rejected or noted on an exception report for follow-up purposes.
6. **Range checking on data inputs**- this ensures that data is entered correctly and agrees with valid predetermined criteria. For example, a valid transaction code must be entered in the transaction field.
7. **Key verification on data inputs**- the keying-in process is repeated by a separate individual using a machine that compares original keystrokes to the repeated keyed input. For example, a worker's number can be keyed in twice to verify the keying process.

c) (i) **Authorization**

It involves determining the access rights to various system resources (hardware e.g. printers, disk drives, etc or programs e.g. payroll applications, inventory applications, etc). Authorization is done by an authorization policy, which defines activities permitted or prohibited within the system. Authorization mechanisms implement the authorization policy and includes directory of access rights, access control lists (ACL) and access tickets or capabilities.

(ii) **Authentication**

It involves verification of the identity of the subject (Are you who you say you are? Prove it!). The most common form of authentication is the password based access control.

QUESTION FOUR

a) Functional components of a computer system:

1. Input devices

They enter program and data into the computer system. Examples are keyboard, mouse, bar code reader, light pen, etc

2. Central Processing Unit (CPU)

This is the part of the computer that processes data. It consists of the main memory, the control unit and the arithmetic and logic unit.

3. Main memory

This is a temporary storage to hold programs and data during execution/processing.

4. Control unit

This controls the execution of programs.

5. Output devices

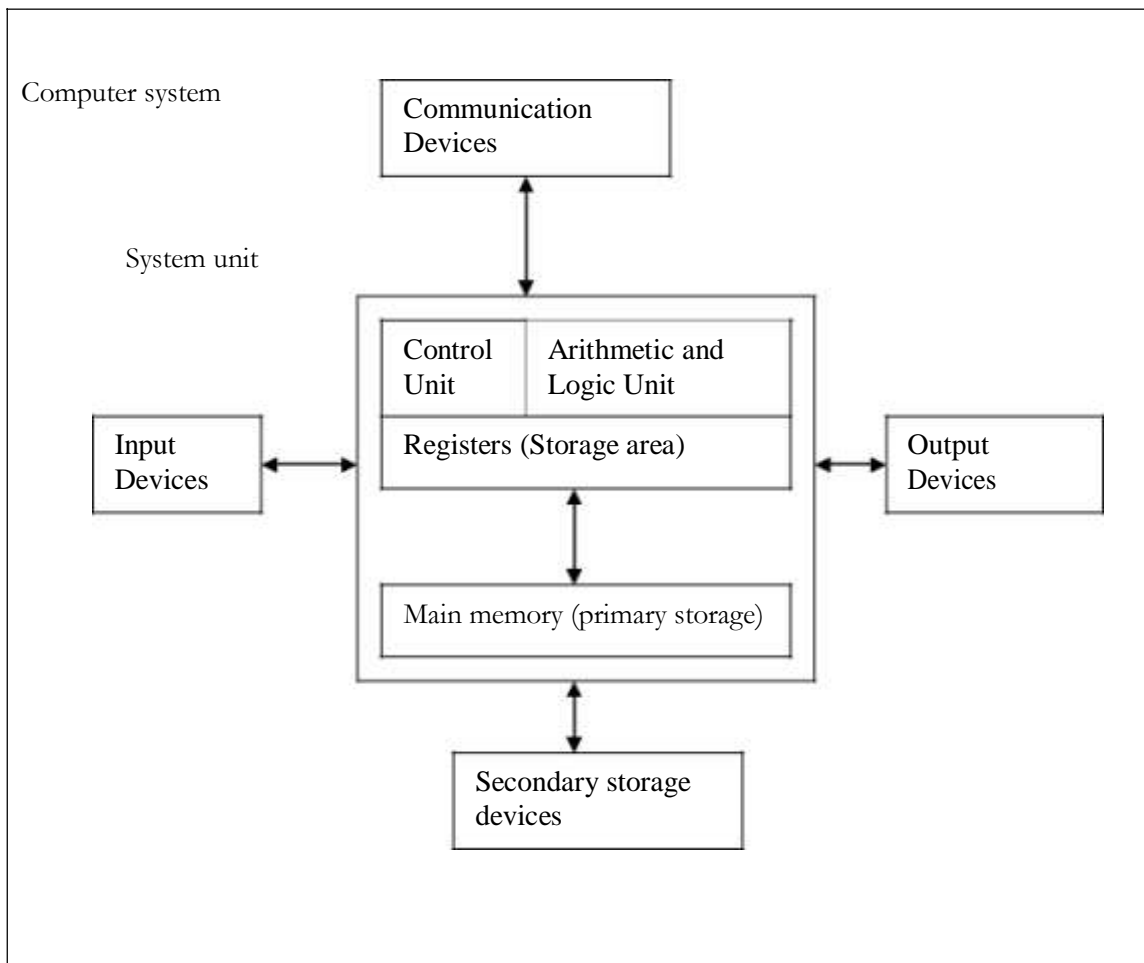
They display information processed by the computer system. Examples are Monitors, printer, overhead projectors, etc

6. Storage devices

They provide permanent storage of data and programs before and after it is processed by the computer system. Examples are hard disks, magnetic tape drives, optical disks, etc

7. Communication devices

They enable communication with other computers. Examples are modems, multiplexors, front-end processors, etc



b) (i) Hardware vs. software
Hardware

This refers to the physical, tangible computer equipment and devices which provide support for major functions such as input, processing (internal storage, computation and control), output, secondary storage (for data and programs), and communication. Examples are the monitor, keyboard, CPU, mouse, etc

Software

This refers to the invisible, intangible components of a computer that direct and control the operations of hardware when processing data. Examples are operating systems e.g. Windows XP, system utilities e.g. Norton antivirus, application programs e.g. Microsoft Word, etc

(ii) Application vs. system software
Application software

This refers to programs designed to help end users to solve particular problems using the computer or to perform specific tasks. Examples are word processors e.g. Microsoft Word, spreadsheets e.g. Microsoft Excel, database management software e.g. Microsoft Access, etc.

System software

This refers to programs that coordinate the activities of hardware and other programs. Examples are operating systems such as Windows XP, Linux and Unix and utilities such as disk defragmenters and antiviral programs

(iii) Bit vs. Byte

Bit

This refers to a binary digit used to represent data in a digital computer. A bit may be a —0ll ora —1ll.

Byte

This refers to a combination of 8 bits used to represent characters (e.g. the letter 'A') in a digital computer.

(iv) RAM vs.

ROM RAM

This stands for Random Access Memory. Its content can be read and changed and is the working area of the user. It's used to hold programs and data during processing. RAM chips are volatile i.e. they lose their contents if power is disrupted.

ROM

This stands for Read Only Memory. Its contents can be read and cannot be changed. ROM chips are non-volatile, so the contents aren't lost if the power is disrupted.

(v) Data vs. Information

Data

This refers to basic facts e.g. the number of items sold by a business, the name of a customer, a line of text or the numerical values used in mathematical formulae.

Information

This refers to data which has been converted into a more useful and meaningful form via processing e.g. a list of all the customers of an organization could be sorted to produce a list of customers who are in debt to the organization.

c) Factors that affect the performance of a computer operation:

1. The cycle speed

This indicates the number of instructions that the processor can handle in a second. For example, a Pentium 4 chip with a clock speed of 2 GHz can handle upto 2 trillion instructions per second. The cycle of a computer is indicated in the system's properties as displayed in the operating system environment (interface).

2. The processor's word length

Word length refers to the number of bits that the computer can process at one time. A 32-bit chip can process 32 bits or 4 bytes of data in a single machine cycle. The larger the word length, the greater the speed of the execution of a cycle. Word length size is implied in the name of the processor e.g. Pentium implies 32-bit processing; Itanium implies 64-bit processing.

3. Data bus width

The data bus acts as a highway between the CPU, primary storage and other devices, determining how much data can be moved at one time. The larger the data bus width, the greater the system performance. Data bus width is measured in bits and it depends on the type of processing chip e.g. the 8088 chip used in the original IBM personal computer, for example, has a 16-bit word length but only an 8-bit data bus width.

4. RAM (Random Access Memory) size

Since all operands (objects being manipulated in an operation e.g. numbers) are loaded into main memory prior to an operation being carried out, the larger the size of the RAM, the more operands that can be accommodated and hence the greater the performance of large

operations. Where the operands exceed the RAM size, the operands have to be swapped (moved) into and out of memory as the operation is carried out. This results in time overheads which means lower performance. Hence, a large main memory provides a greater capability for high performance than a small main memory for complex/large operations. RAM size is measured in bytes and it's indicated in the computer system unit. RAM size can also be calculated by counting the number of RAM chips in the motherboard of the computer

d) Issues to be considered when planning for IS training:

1. The staff to be affected

Whether the staff includes senior managers, middle managers or operational staff as determined by the type of information system in consideration. For example, for a transaction processing system, the staff to be involved in the training exercise will be operational clerks and middle managers since they are the ones who handle the system.

2. Who should carry out the training?

If an organization doesn't have adequate training personnel then it should consider hiring the services of another company when planning for IS training.

3. Cost of the training

This should be determined so as to allocate enough money to the training process to ensure success of the exercise.

4. Estimated time for the training

This should be considered so that training is allocated adequate time. This ensures that what was meant to be learnt is learnt and that everything is understood.

QUESTION FIVE

a) Requirement review/walkthrough:

This refers to a planned review of a system that is carried out by people not involved in its development effort in order to examine a proposed system as formulated by the systems analyst. If there are any inconsistencies between the requirements stated by the users and those that the analyst is proposing, the review should be able to uncover such inconsistencies.

People involved in a requirement review and their roles:

1. Chairman

- He/she controls the overall direction of a walkthrough and ensures that its agenda is adhered to.
- He gives approval by signing the project milestones when users are satisfied at each development stage.

2. Author

- He is the creator or designer of the system.
- He presents and explains the materials that are being reviewed/walked through.

3. Recorder

- He acts as a secretary of the team and ensures that all agreed actions pointed out are noted and followed up.

4. Reviewers

- They get in advance the materials being walked through as a working model.
- They walk through the proposed system and check whether it falls short of required quality.

5. User representative

- He approves their (the users) understanding and satisfaction of what they will do with the system when it becomes operational. The representatives may be senior managers, auditors, etc

b) Remote network management:

This refers to the implementation of the network management functions of configuration, performance monitoring, fault isolation, accounting, security and network installation and monitoring from a distant terminal with the aid of network management software designed to carry out the functions.

Configuration- involves initializing the network, enrolling new members, controlling the topology, keeping equipment inventories, etc

Performance monitoring- involves monitoring throughputs, delays, detecting packet and frame errors, etc for all layers of communication

Fault isolation- involves detection of faulty conditions on the network, tracing of error sources, and general test and maintenance aids.

Accounting- involves keeping a record of the usage of network resources for billing purposes e.g. recording the usage of a shared printer by each department for the purposes of billing, recording the total time spent on a dial-up connection by each department for the purposes of billing, etc

Security- involves access control, encryption and authentication, reporting of break-in attempts and success.

Security implications of remote network management:

1. Unauthorized access would have to be detected immediately and the terminal involved identified so as to effectively control unauthorized access.
2. Data at every node would have to be secured from un-authorized modification or deletion so as to prevent destruction of data at any node in the network.
3. The security function of network management would have to be centralized on a terminal so as to simplify the administration of security.
4. All data in transit would have to be secured remotely to prevent eaves dropping.
5. A log of all accesses to the network must be maintained to enable the network manager identify instances of successful unauthorized access and employ the relevant preventive mechanisms.

Security mechanisms needed for remote network management:

1. **Username and password systems-** to prevent unauthorized access
2. **Use of audit trails.** The audit trails could be maintained by the network operating software. Audit trails enable instances of unauthorized access to be identified thus enabling preventive mechanisms to be put in place to stem unauthorized access in future.
3. **Data encryption** to prevent unauthorized access.
4. **Record and file locking** to prevent simultaneous update of files thus maintaining integrity of transactions.
5. **Use of firewalls** to prevent protect the network from external threats e.g. hackers

(ii) Challenges facing the convergence of networks in business organizations:

1. Incompatibility of different organizational networks

Organizational networks may be incompatible because of the hardware in the networks or the protocols in the networks and this may prevent the convergence of networks.

2. Security concerns

Organizations may be reluctant to converge their networks because converging the networks would expose individual organizational networks to more security threats e.g. hackers who may corrupt organizational data

3. Competition amongst business organizations

Fierce business competitors may be reluctant to converge their networks because convergence would imply sharing of data in the network which may be perceived as a threat to the competitive advantage of an organization with respect to its competitors.

4. Cost concerns

Convergence of networks would imply interconnection costs which vary according to the medium used to interconnect the networks. For instance, a satellite link to the nodes in the network would be very expensive as compared to a phone line link.

5. Lack of uniformity in legislation across many countries

Most countries in Africa lack well-defined data protection laws and computer crime laws in contrast to European nations that have well defined laws put in place (e.g. The Data protection act of England). It's clear that convergence of networks across such states may bring about problems since what may pass as law in one country may not pass as law in another country. Perpetrators of computer crime may take advantage of this opportunity.

6. Poor telecommunications infrastructure

This hinders the establishment of links between organizational networks thus posing a challenge to the convergence of networks.

QUESTION SIX**a) (i) Functional correctness of software**

This refers to the extent to which a program satisfies its specification and fulfills the user's mission objectives. Functional correctness of software can be measured by performing a structured walkthrough (Specifically a program review) which establishes whether a program satisfies its specification. The functional correctness of a program can thus be determined from the number of issues raised during the structured walkthrough. Functional correctness of software may also be measured by performing black box testing. The number of errors discovered during the testing exercise would thus indicate the functional correctness of the software.

(ii) Reliability of the software

This refers to the extent to which a program can be expected to perform its intended function with required precision. Reliability could be measured by software quality metrics (software quality measurement techniques) such as the rate of failure of occurrence (ROCOF) which is a measure of the occurrence with which an expected behaviour is likely to occur. Another metric i.e. the mean time to failure (MTTF), which is a measure of the time between observed system failures, may also be used.

b) Examples of industries and business organizations that currently use computer networking:

1. **Nation media group** which has an Internet website which it uses to advertise and also to sell online subscriptions to its newspaper, the *Daily Nation*.
2. **Safaricom Ltd** which uses its Internet website to advertise its mobile telephony services and also to provide customer care services to its subscribers.
3. **Intel Company** which uses the concept of peer-to-peer networking (networking architecture that gives equal power to all computers on the network. Its used primarily in small networks) to speed up design of its Intel chips by enabling designers to share chip designs.
4. **Glaxo SmithKline** which uses peer-to-peer networks from Groove Networks Inc to help researchers create a worldwide collaborative network with scientists from universities and biotechnology companies.
5. **KASNEB PANEL** which uses the Internet and intranet for advertising courses and for providing registration to programmes offered.

c) Major differences between human intelligence and artificial intelligence:**Artificial intelligence**

This refers to the effort to develop computer-based systems (both hardware and software) that behave as humans. They're used to make decisions that would otherwise have been done by humans.

Major differences:

1. Common sense and generality

Human intelligence is characterized by an ability to develop associations and to use metaphors and analogies such as like and as. Using metaphors and analogy, humans can create new rules, apply old rules to new situations and at times act intuitively and/or instinctively without rules. Artificial intelligence on the other hand, cannot develop associations and use metaphors and analogies. It acts purely on facts and information supplied to it.

2. Ability to impose a conceptual apparatus on the surrounding world

Metaconcepts such as cause and-effect and time, and concepts of lower order such as breakfast, dinner, and lunch, are all imposed by human beings on the world around them. Thinking in terms of these concepts and acting on them are central characteristics of intelligent human behaviour. On the part of computers, they cannot create and impose such metaconcepts in their logic and thus have to rely on the ones created by humans.

3. Ability to develop new and novel solutions to problems

Successful artificial intelligence systems are based on human expertise, reasoning and selected reasoning patterns. They are thus rigid in their decision-making since their knowledge base is static (finite rules and finite information). Human intelligence on the other hand, is dynamic in decision making due to common sense and generality and can thus formulate new and novel solutions to problems presented to it.

d) Disadvantages of direct access storage devices:

1. Expensive

The cost of devices such as hard disks which are online media and mandatory in almost every computer system is high and further varies according to the storage space required. RAM chips are also very expensive which is one of the limiting factors in the RAM size of today's computers.

2. Easily damaged

Magnetic disks and optical disks are usually very sensitive to handling and are thus easily damaged. For instance, magnetic disks are sensitive to dust, heat and strong magnetic fields which can result in data loss in the disk due to disk damage.

QUESTION SEVEN

a) Features of information needed for strategic planning:

1. Information has a greater orientation to external data

Strategic plans are concerned primarily with positioning the organization in the optimum position in the environment to meet targets and objectives, while allowing the organization to develop dynamically in response to changes in that environment. This information required for strategic plans tends to come from a higher proportion of externally generated data.

2. Information is usually presented in a **highly summarized form** in the form of graphs, charts and tables.
3. The information **covers all aspects of the organization** i.e. it encompasses all the departments of the organization.
4. The information relates to **medium to long-term (months to years)**.
5. The information has **high levels of uncertainty** since the focusing is on a long-term.
6. The **accuracy (in the sense of paying attention to little details) of the information is less critical** to decisions at this level.
7. The data incorporates **higher proportion of subjective valuations**.
8. The performance focus of the information is on **predictive rather than historical performance**.

b) Information Communication Technology

This refers to the use of computers, telecommunications equipment and other technologies associated with automation for the transmission of information.

Risks in using ICT as a strategic resource:

- ☐ **Change-** ICT is vulnerable to change which may compromise its relevance to an organization. For example, production of higher versions of software product may render earlier versions obsolete as is the case with Windows 95 after the release of the versions Windows 98, Windows 2000 and Windows XP which provide more advanced networking and security features.
- ☐ **Over expenditure on hardware, software, installation of networks, personnel, etc.** An organization could find itself spending freely on hardware, software, installation of networks and personnel in cases where no proper budgeting is made before initiating an ICT project.
- ☐ **Poor selection of ICT resources** that are needed to meet the competitive strategies of an organization. Poorly selected resources results in wastage of organizational funds. It may also result in failure of the organization to meet its strategic objectives since the poorly selected resources may only partially meet the strategic objectives of an organization.

4. **Security issues**- using ICT as a strategic resource would mean that there would have to be adequate security mechanisms to prevent hardware resources from sabotage, theft and misuse. Data must also be protected from corruption or unauthorized access.

Actions that need to be taken:

1. **Change management approach**- an organization should strive to keep up with changes in the ICT sector to avoid being left behind. This requires constant market research and periodic appraisal of its systems.
2. **Adequate budgeting procedures** should be put in place to ensure that only necessary resources (hardware, software, personnel) are acquired by an organization.
3. To avoid the risk of poor selection of resources, management should seek adequate **consultation** from the IT manager of a company or from an IT consultancy firm.
4. To counter the security risks in using ICT, adequate **security mechanisms** such as usernames and passwords, data encryption, physical security measures such as electronic door locks and mechanical door locks used to be put in place.

c) Summary reports generated by EPOS:

1. **A summary report of all the goods purchased at the terminals.** This may be done after referencing the terminal's database.
2. **A summary report of the total units of each type of good sold.** This may be produced after a detailed search through the database during which the item codes for each type of good are identified and the sales related to each item tallied.
3. **A summary report of the remaining stock**

The EPOS automatically updates its database after every purchase is made therefore at any one time, one may produce a summary report detailing the remaining stock in the stores.

Summary report generated by ATM:

1. **A summary report of the actual and available cash balance of an account holder**

After the account holder authenticates himself on the ATM and requests a balance slip, the system runs a query to find out the actual balance of the account holder and deducts the minimum cash balance allowed for specific account type to arrive at the available cash balance.

2. **A cash receipt** for payment of utilities e.g. water, electricity, etc. This is generated immediately after payment has been made.
3. **A foreign currency withdrawal slip.**

This is generated after foreign currency has been withdrawn. It indicates the amount withdrawn and the remaining actual and available balance.

QUESTION EIGHT

a) Functions that have moved to the Internet:

Sales

Most businesses today in addition to selling their goods through traditional channels also sell their goods through the Internet. Purchase of goods is by use of credit cards. Consumers are increasingly adopting this mode of purchase of goods because it's very convenient to them. The consumers can purchase the goods and services at any time at the convenience of their homes.

Benefits to enterprises:

1. Globalization

A company based in only one continent is able to reach consumers in all the other continents through this approach. Thus, the customer base is increased with this approach.

2. Virtual businesses

Organizations that totally adopt this approach do not have to set up premises for the purposes of sales. They only need a warehouse to store their stock. Thus, this approach is beneficial because it lowers premises costs.

3. Reduced sales personnel

With this approach organizations can reduce the sales personnel since part of the sales are through the Internet. Thus, they are able to cut labour costs.

Marketing

Most businesses today are also marketing their goods and services through the Internet. The marketing of these products and services need not be necessarily through a company's corporate website. It could be through search engines via sponsored links.

Benefits:

1. Large consumer reach

This approach is capable of reaching customers in all parts of the world.

2. Easy to target specified groups/categories of customers

A company could advertise in sports sites, health sites, music sites and news sites to enable it target a specific clientele.

3. Personalized marketing

A company could personalize its marketing strategy by targeting each individual consumer through e-mail. This has the effect of improving the effectiveness of the marketing since it makes customers feel that they are important to an organization.

b) E-governance

This refers to the application of electronic means in the interaction between government and citizens and governments and businesses, as well as in internal government operations to simplify and improve democratic government and business aspects of governance.

Areas where e-governance is beneficial to the public:

1. Online license applications/renewals.
2. Online renewal of car tags, vehicle registration.
3. Payment of property taxes online.
4. Payment of utility bills online.
5. Registering and voting online.
6. Downloading of forms on websites e.g. passport application
7. Submitting forms online e.g. ID application
8. Online help with filling forms (permits, birth/death certificates)
9. Discussion groups on websites that facilitate democratic exchange of ideas.
10. Online polls and questionnaires.
11. Online notification of citizens.
12. Online versions of laws, rules and regulations.

DECEMBER 2012 – SUGGESTED SOLUTIONS

QUESTION ONE

(i) These employees perform the following jobs.

Senior systems Analysts – he is the head of system analysts. These employees analyze the existing system with a view to their computerization. They design systems and oversee their implementation and review. They are actively involved in the upgrading of the system.

Database administrators – they ensure that the data in the database meets the information needs of the organization involved in retrieving data and structuring reports, which are appropriate to the organization.

Systems security managers – they are involved in ensuring the security of the system is not compromised. They ensure that no outsiders or unauthorized persons access the information..

From the above information, it can be seen that these employees access valuable information and if they are compromised then the firm can suffer. The following measures are put in place to curb this.

1. Administrative controls – they include.
 - (a) Policies – policies outlining and requiring each employee to do certain things and not others. Things not authorized to be done are threats to security.
 - (b) Administrative procedures – put by an organization to ensure that users only do what they are authorized to.
 - (c) Legal provision – this serve as security controls by laying down legal penalties which may be suffered in case of breaches in security.
 - (d) Ethics – a strict code of conduct by the organization to be followed by the employees can boost security.
 2. Logical security controls – these are measures incorporated within the system to provide for security against the employee. This include the need of passwords to access any information.
 3. Physical controls – this include lockups. The offices should be locked at the end of the day and no employee should access the others office. It also encompasses employing security guards to prevent unauthorized access.
 4. Rotation and Compulsory Leave – an employee should not be allowed to stay in one place for long but should be rotated. Due to this threats of fraud are discovered in advance. Compulsory leave should be given and work reviewed in case of any perceived threat on security.
 5. Good Remuneration – the employees should be paid well to guard against compromising.
- (ii) Every individual in an organization can commit fraud. The potential of an employee committing fraud depends on the following: -
1. Security – inadequate security and loopholes in the security system can be a potential motivator to an individual to commit fraud. An employee who knows that he can commit fraud without being found out would be greatly motivated.
 2. Remuneration – individuals who are poorly paid are highly susceptible to committing fraud to make their ends meet.
 3. Company policies – if employees are aware that the organization policies are not stringent then they are likely to be involved in fraud. Absence of policies like rotation of employees or compulsory leave will be a driving factors as chances of being caught are low.
 4. Ethics – the code of conduct of a company also play a major role. In organizations where there is laxity then the chances are high that employees will engage in fraud.

5. Legal provision – where no legal sanctions are imposed, on the employees if found guilty of fraud, they could engage in fraudulent activities.

B) Principles of technological ethics include: -

- (a) Honesty and trustworthy – a honest computing professional should not make deliberate or deceptive claims about a system or systems design, but should instead provide full disclosure of all pertinent system limitations and problems.
- (b) Privacy - it is the responsibility of professionals to maintain the privacy and integrity of data describing individuals. Data should be protected from unauthorized access.
- (c) Integrity – the information users and professionals should maintain integrity in use of the information. This ensure the accuracy and reliability of the information stored on computers.
- (d) Confidentiality – this involves respecting of data which touches on individuals. This is to respect all obligations of confidentiality to employers, clients and users unless disclosure is required by law.

C) Advantages of users being involved in developing an information system application:

- (i) Users know the internal quirks of the system in order to get required information.
- (ii) Improves relationship between users, management and developers
- (iii) Improves system literacy of users and subject understanding of developers.
- (iv) Conflict resolution become responsibility of both users and developers. This eases conflict resolution.
- (v) Improves system analysts time by focusing on work relations and gathering project resources simultaneously.
- (vi) Lowers cost of system development by defining requirements completely and correctly in a short time period.
- (vii) Increases team satisfaction confidence and support
- (viii) Reduces maintenance time due to earlier application completeness and correctness of satisfaction.

QUESTION TWO

2 (i) Bandwidth – bandwidth is the bits-per-second (bps) transmission capability of a communication channel. It also refers to the amount of data that can be transmitted in a fixed amount of time. There are three types:-

- (i) Voice band – bandwidth of standard telephone lines.
- (ii) Medium band – bandwidth of special leased lines used.
- (iii) Broadband – bandwidth of microwave, satellite coaxial cable and fibre optic.

Interconnectivity costs

These are costs incurred in running a network. These costs basically include the subscribing costs which run when the network is interacting with other networks. It also includes unquantifiable costs like security threats.

- (ii) Factors that determine the extent to which network performance degrades or Slows down: -

- i) Bandwidth – the size of the bandwidth will determine the speed of network. A large bandwidth will be sufficient to support a large number of network users without slowing down the network.
- ii) Software - For example, a network operating system with a high performance (eg linux operating system) can be able to provide a high network performance.
- iii) Hardware – different hardware have different capability thus if the hardware is outdated then the network will slow down.

- iv) Dedication of the servers – when a server is connected to different networks then it will be painfully slow as so many users are using the server. As such servers should be connected in a way to serve limited networks for optimum performance.

Software – the software of the components of a network will have influence on the network.

QUESTION THREE

3 (i) strategies – are plans made to improve the position of a situation. The strategies to be adapted are:-

dedication of servers – servers in the organization should perform specific functions to reduce overload on the server leading to slowness and thus decrease the costs that arise when the network is down.

Working offline – the organization should do most of the work offline and only go online when sending or in need of information online.

Use updated software – make use of modern software which do the work faster and better. This could be done by either updating the software or just getting new software.

Common reasons for losing data

- (i) Ignorance – a software user may delete data files maintained by a software because he/she does not know how to operate the software or is unaware of the consequences of deletion.
- (ii) Accidents – a user may accidentally delete data files maintained by software due to mistaken identity of files.
- (iii) Fraud – employer may access and delete security log files to cover any illegal activities taking place.
- (iv) Malice – hackers may delete organizational data in order to bring down the operations of an organization.
- (v) Poor management of data stores – could result in the theft of companies' diskettes containing sensitive data.

3 (a) Quality assurance – involves the entire software development process. It is the monitoring and improving the process making sure that any agreed procedures are followed and problems are found and dealt with. The characteristics are:-

- (i) Reliability – the software should fit the users requirement and perform the functions they are designed for.
- (ii) Documentation – the software should be accompanied by a manual which is easy to understand. This helps in use and maintenance of the software.
- (iii) User friendliness – the software should be easy to use with clear on screen prospects, menu driven and extensive screen help facilities.
- (iv) Controls – it should have in-built controls which may include passwords, options, validation checks.
- (v) Up-to-date- the software should be up-to-date..
- (vi) Modification- the software should be modifiable to fit the requirement of users.
- (vii) Compatibility of software- it should integrate easily with other software in use in the system.

(b)

Graphical User Interface (GUI) – refers to the interaction between end users and the computer based upon a graphical display. These are tools which are designed to enhance personal computing work. They are mostly fitted on work stations or personal computers with graphical adaptors able to support high resolution graphics.

Limitations of Graphical User Interfaces:

- i) System slow down – when you open so many windows which have the GUI facility, the system will slow down.
- ii) Too much information – the user cannot focus on all the information presented to him on the GUI
- iii) Inflexible icons – the icons take you to specific location and if you want to change your cursor you have to go back to the first window which is cumbersome in a way.

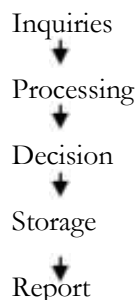
(c) Information System – refers to a collection of components which collect, process, store analyse and disseminate information for specific purposes. The factors influencing its structures are:-

- (i) Cost – a complex information system is expensive so a firm will design a system they can afford to run.
- (ii) Requirement – the information requirement will determine the structure or the information system of an organization.
- (iii) Level of training – the knowledge of users will also determine the structure of an information system. A complex system structure will require more training thus a company may decide to have a less complex one to limit training costs.
- (iv) Existing software – the availability of software that can support a system will have an impact on the structure of the system.
- (v) Availability of staff – the number of staff with knowledge to run a system will have an impact on the structure of the system.
- (vi) Availability of hardware to support the system. If such hardware is unavailable then the company will search for an alternative structure.

QUESTION FOUR

4 (a) Stages of a transaction processing cycle.

- (i) Processing of inquiries – the system processes the inquiries made using the database.
- (ii) Processing the transaction – depending on the outcome of the inquiries, the system processes the activity such as buying or selling
- (iii) Making decisions – the system uses application to support systems for planning, analysis and decision making. Decisions are made on the transaction e.g. at what price to sell.
- (iv) Update master file – the system then stores the information relating to the transaction.
- (v) Produce reports – the system winds up by producing a report on the transaction.



4 (b)

Data dictionary is an automated manual tool for storing and organizing information about the data maintained in a database. A data dictionary is a file which defines the basic organization of a database. It contains a list of all files in the database, the number of records in each file and the name and types of each field. All data elements contained in data dictionary are accompanied with a short description on what they are.

Its characteristics are:

- (i) A query facility:- this is both for administrators and casual users. It helps users to perform searches on items like business definitions, user descriptions or even synonyms.
 - (ii) Automated input facilities:- this are to enable loading of records
 - (iii) Security features:- to help in protecting the information contained in the data dictionary
 - (iv) Comprehensive data reporting language for user designed reports.
 - (v) Language interphase, to allow, for example standard record layouts to be automatically incorporated into programs during the compile process.
 - (vi) Help facility – this helps to instruct users on how to use the data dictionary.
- (c) (i) Functional integration – this is the dividing of the functions among individuals in a work station. Once an individual is only allowed to perform particular duties and not others. It differs from physical intergration in that one machine can be used by different persons. In functional integration, only that the individuals will be involved in different duties.
- (ii) Physical integration – this is the allocation of work machines to individuals to use in the firm. A particular person is assigned a machine to work on and no sharing of machines takes place. However people can perform the same functions. Under this form of intergration.

QUESTION FIVE

- 5) Functional requirements required
- (i) User requirements – the system should be able to meet the need of the firm and its users as closely as possible.
 - (ii) Processing time – it should have a short response time. A faster system will be very appropriate.
 - (iii) User friendliness – the system should be easy to use with clear on screen prompts menu driven and extensive on screen help facilities.
 - (iv) Controls – the system should have in built controls which may include passwords, validation checks, audit trails etc to boost information and data integrity.
 - (v) Flexibility – the system should allow for future modification in case of requirement changing.
 - (vi) Compatibility – the system should be compatible with other system to allow simulations with user systems
 - (vii) Portability – the software should be able to run on the firms different machines.
- 5 (b) Four features of a word processing software package:
- (i) A drawing tool bar to enable one to accommodate various shapes and lines in word processed documents.
 - (ii) Automated formatting such as bolding, italizing, underlining, capitalizing indenting and paragraphing of text.
 - (iii) Print previews which enable one to see the output and identify areas of improvement in the formatting and layout.
 - (iv) CV, letter, memo and other document wizards which guide one through the document creation process.
 - (v) Help to provide assistance to users.

5 (c)

1. Documentation – this is the description of a software in written form after its development.

The importance are:-

- (i) It guides the development team at various stages of the development life cycle.
- (ii) Can be used as a system back up copy should something happen to its implementation
- (iii) It aids or assists during system maintenance since it guides in identification of system modules to be changed.
- (iv) Effectively provides a check list of items to be covered during subsequent system audit a maintenance.

- (v) Guides against loss of system understanding particularly when the author leaves the company or dies
- (vi) Act as a training guide for users.

2. Importance of agreeing on the information system requirement.

- (i) Improves relationship between users management and developers. It ensures that potential dispute areas are reduced.
- (ii) Lowers the cost of system development by defining the requirement time completely and correctly.
- (iii) Increases team satisfaction, confidence and support.
- (iv) It makes it easier to plan to project as the total costs can be estimated with more accuracy.

3. Basic requirement for the internet connection

- (i) Modem – a transmitter which encodes the information.
- (ii) Computer – the source and destination for the data.
- (iii) Wire a complex network – this is the transmission system
- (iv) Internet service provider (ISP) – provides access to the internet at a periodic cost.

QUESTION SIX

6 (a) **Factors to be considered in the process of establishing the corporate database.**

- (i) Requirements by the organization.
- (ii) Effect of the system on the existing organization structure.
- (iii) Redundancy or retrenchment. Implication to the company as a result of the new system.
- (iv) Effect on the current working practise. **Technical**
 - (i) Hardware and software requirement of the system.
 - (ii) The current technology and whether it can support the system.
 - (iii) Whether there are specialized persons to handle the system once installed.

Human

- (i) Redundancy or retrenchment, implication to the company as a result.
- (ii) The reaction of individual both from within and without the organization.
- (iii) Necessity of training.

11. **Hierarchical Data Model** –it presents data to users in a tree like structure.

Network Data Model –a logical database model that is useful for depicting many to many relationship.

Relational Data Model –a type of model that treats data as if they were stored in two dimensional tables. Related data is stored together or near each other.

111. Database areas which needs to be restricted.

Sensitive data –applies to information that requires special precautions to assure the integrity of the information, by protecting it from unauthorized modification or deletion. It is data that requires a higher than normal assurance of accuracy and completeness e.g. passwords, on encryption parameters.

Confidential data –applies to the most sensitive business information that is intended for strict use within and organization. Its unauthorized disclosure could seriously and adversely impact the organizations image in the eyes of the public e.g. application program same code. Project documentation etc.

Private data –applies to personal data intended for use within the organization. Its unauthorized disclosure could seriously and adversely impact the organization and/or its customers e.g. customers account data, e-mail messages etc.

Public Data –applies to data that can be assessed by the public but can be updated/deleted by authorized people only eg company web pages, monetary transaction limit data.

- (b) Network management functions include: -
- (i) Resolving conflict between users and technical people when using the system.
 - (ii) Overseeing the network security
 - (iii) Evaluating the network performance to see whether it meets the organizational needs.
 - (iv) Ensuring compliance to rules by the network.
 - (v) Maintaining the network and ensuring its operation is up to date.

QUESTION SEVEN

- 7 (a)
- (i) Failure to establish upper-management commitment to the project.
 - (ii) Lack of organizations commitment to the system development methodology.
 - (iii) Taking shortcuts through or around the system development methodology can lead to system failure and hence abandonment.
 - (iv) Insufficient resources both financial and otherwise
 - (v) Failure to adhere to the set budget, time and finances.
 - (vi) Premature commitment to a fixed budget and schedule.
 - (vii) Obsolescence of the system under development

- 7 (b)
- (i) The standard files are inflexible hence may not adapt to your requirements
 - (ii) It limits creativity as you have to adhere to set rules.
 - (iii) Does not give competitive advantage over rivals, as the features are same.
 - (iv) Its hard to get standard files which fit all your requirements.
 - (v) Its security controls are not so effective thus can be infiltrated easily.

Problems faced when using standard files for data processing systems:-

- (i) Data redundancies and confusion in data storage
- (ii) Difficult to effectively secure data.
- (iii) Difficult to modify data due to data redundancies.
- (iv) They require a lot of storage resources due to data redundancies.

- 7 (c)
- (i) **Management Information System (MIS)** –provides continuous information to decision makers to make structured, recurring and routine decision.
 - (ii) **Decision Support systems** –provides problem-specific support for non-routine dynamic and often complex decisions a problem.
 - (iii) **Expert system** –it is knowledge system which provides information when interacted with.
 - (iv) **Data Management system** – it's a system which stores data for use by various individuals.
 - (v) **Virtual Reality System** –it is a 3-dimensional simulation software where the user is immersed in a simulated environment using special hardware.

7 (d)

Deterministic systems – it's a system in which various steps/activities follow on from each other in a totally predictable way e.g. A will happen, then B then C.

Examples of such systems are :-

- (a) Fully automated production process
- (b) Computer program

In such a system there is predictable input and output as the system reacts in a predictable way.

Random systems –also known as probabilistic or stochastic system. It is one in which some steps/activities can be predicted with certainty and other will occur with varying degrees of probability. There are many probabilistic systems in a business organization e.g. provision of bad debts.

QUESTION EIGHT

8 (a)

Structured decisions –these are repetitive and defined decisions. A standardized pre-planned approach is used to make the decision and a specific methodology is applied routinely.

Semi structured decision –the information requirement and the methodology to be applied are often known, but some aspects of the decision still rely on the manager. As such the manager can exercise some discretion in the making of decisions.

Unstructured decisions –tends to be unique. The information needed for decision-making is unpredictable and no fixed methodology exists. Here the manager exercises a lot of discretion.

From the above definitions it is clear that the decision made by the owner of this classic store is semi-structured. She incorporates the information from the computer which is automated and uses judgment to make decision. The product related variables in making ordering decisions are :-

- (i) The quality of the products.
- (ii) The quantity to be ordered.
- (iii) The availability of the products needed.
- (iv) The availability of supplies and reliability.
- (v) Availability of cash to purchase.

8 (b) Decisions that management may make from the break even analysis model:

- Decision on the selling price of the products in order to obtain certain profit.
- Marketing decision in order to make the required sales.
- Determining the variable costs of the products in order to make required profits. This could be by buying cheaper raw materials.
- Decide the number of units to be produced.

(ii) An expert system is a system that acts as an expert consultant to users. Reason for its use include: -

- For consistency in the decision being made
- Speed- the expert system is faster than a human being expert.
- Permanence – the experts can die or leave but an expert system can be used for a long time, use will only stop if it is changed.
- Remote areas – expert system can be used in areas where human being fear going eg. Arid areas, bad climate area etc
- Objectivity – decisions made by expert systems are not guided by passions or feelings as such decisions are always for the best interest of the organisation.
- Experts are costly to maintain, expert systems on the other hand involve only one off costs, the acquisition.

KENYA ACCOUNTANTS AND SECRETARIES NATIONAL EXAMINATIONS BOARD

INFORMATION COMMUNICATION TECHNOLOGY

June 2013

QUESTION ONE

- (a)
- i.
 - To learn **more about your prospective client's needs.**
 - To clearly define the product or service that you wish to offer these clients.
 - To determine cost of the solution to be developed.
 - ii.
 - a. Interviewing users, employees, managers and customers
 - b. Observing or monitoring users of the current system to determine their needs as well as their satisfaction and dissatisfaction with the current system.
 - c. Developing and administering questionnaires to interested stakeholders, such as potential users of the information system.
 - d. Collecting, examining and analyzing documents, reports, layouts, procedures, manuals, and any other documentation relating to the operations of the current system.
 - e. Modeling, observing and simulating the work activities of the current system.
- (b)
- (i)
 - Text
 - Audio
 - Graphics
 - Video
 - (ii)
 - Virtual reality
 - Graphical information service (GIS) systems
 - Presentation in classroom; seminars.

QUESTION TWO

- (a)
- ICT can prove useful during the reengineering analysis and design process.
 - Graphics software and CASE tools can produce process maps.
 - Spreadsheets and costing software allow for activity – based cost analysis.
 - Databases can track customer satisfaction and complaints.
 - **—Blindll e-mail** bulletin boards can be used to capture employee suggestions.
 - Email and groupware can facilitate communication and coordination across geographical and organizational barriers.
- (b)
- (iii)
- Obstacles**
- Attitude or beliefs perhaps arising from cultural and religious or social Influences.
 - Politics i.e. resisting change that might weaken the power in the base of an Individual or group strength a rival position.
 - Personal self – interest
 - Misunderstanding
 - Different view points of the situation

- Low tolerance of change

Strategies

- Negotiation e.g. offer incentives to the resisting parties.
- Evaluate and reassure resisting parties.
- Participation and by involving potential resistors.
- Force change through and then support the new behavior it requires (carrot and stick method).

(iv)

- Comparison of the actual system performance against the anticipated Performance objectives. This involves assessment of the system Running cost, benefits etc as they compare with estimated or anticipated.
- The staffing needs and whether they are more or less than anticipated.
- Any delays in the processing and effects of such delays.
- Effectiveness of the inbuilt security procedures in the system.
- The error rates for input data.
- The output i.e. whether it is correct, timely and distributed correctly to the relevant users

QUESTION THREE

(a)

(i)

Electronic audit trail – A record provided by some business and financial software of all the transactions that have taken place during previous amendments to data in order that subsequent checking may take place.

(ii)

Audit around the computer

Audit around the computer refers to the approach of first reviewing input data and then directly reviewing outputs from the computer, which circumvents direct usage of the computer. By adopting such an approach, auditor's do not review computer Processing or application controls but judge the correctness of the processing by examining inputs and outputs.

Audit through the computer

By audit through the computer, auditors examine documents and procedures in the Computerized accounting systems and then further review results of accounting.

(b)

- Distributed processing
- Networks
- Database Technology
- Decentralised organization structures.

QUESTION FOUR

(a)

- Network Interface card (N.I.C)
- VGA card
- Sound card

(b)

- Image scanner – converts images on a page to electronic signals
- Character and mark Recognition devices – scanning devices used to read marks on documents.
- Fax machine – converts light and dark areas of an image into format that can be sent over telephone lines.
- Barcodes readers – photoelectric scanner that reads vertical stripped marks printed on items.

How a scanning device(Scanner) works

A light bar moves across the object being scanned (the target) and the light is reflected to the charge coupled device (CCO) by a system of mirrors. Each cell produces an electrical signal proportional to the strength of the reflected light that hit it. The signal which represents one pixel in the original images is converted into binary number and sent to the computer. Darker portions of the target reflect less light and are given lower numbers

(c)

- As a disc, DVD looks very much like the CD. Both are shiny discs that are 4.75" (112.0cm) in diameter. Both are optical formats containing digital information.
- Smaller pit size
- Tighter track spacing
- Multiple layer capability
- The DVD may be used for video, audio, or data storage.

QUESTION FIVE

(a)

Volatility – This is the frequency with which records are added to the file or deleted from it. If the frequency is high, the file is said to be volatile.

A file that is not altered is —static—. If frequency is low, the file is said to be —semi-static—.

Activity – Is the processing of a master file. Hit rate is a measure of the activity of the file.

Size – This is the amount of data stored in the file. It may be expressed in terms of the number of characters or number of records.

Growth – Files often grow steadily in size as new records are added. growth must be allowed for when planning how to store a file.

(ii)

Volatility

- A file with Volatile variable (has data that can be changed with external process) is preferably designed to be accessed using index sequential.
- This is because of speed of access; index sequential files are faster to locate than random or sequential files.
- For a file whose records are relatively permanent in nature meaning that the hit rate is low, then random file organization would be preferred.

Activity

- Files that are accessed every now and then should be designed to be accessed using index sequential method. Speed being one of the reasons for this. Since its mostly used in transaction files where the hit rate is high to enable records to be located faster.

Size

- A small sized file can well be accessed using random method or sequential method where as a large file containing large amount of data, its data can easily be located using an index sequential method since an index file can be used to effectively overcome the problem of key searching, and to speed up the key search as well.

Growth

- The same consideration would be put in place as that of size of files.

(b)

GUI – Graphical User Interface–Is a human computer interface (HCI)based upon a graphical display. The GUI software is organized in layers including components such as windows libraries.

Advantages of GUI

- Graphical symbols are more easily recognized and memorized than text.
- Direct manipulation, for example by pointing and clicking on graphical objects with a mouse, reduces learning time for users and gives them a greater feeling of control over the HCI.
- Make computer operations more intuitive and thus easier to use and learn.
- Provide users with immediate, visual feedback about the effect of each action.
- Allow users to take full advantage of the powerful multitasking

QUESTION SIX

(a)

- Increased access: Through networks, it is possible to access remote databases.
- Large capacity storage: Databases technology has facilitated storage of large amounts of data in corporate databases.
- External Storage Media: Such media is flash disk, DVD, can carry large amounts of data making it possible to transfer data from one point to the other.

(b)

- Poor utilization of database storage space which might be minimal. Large storage space requirements.
- Problem of securing all the redundant data. Though the data in such a database is redundant, it must still be secured from unauthorized access. This task is very difficult to implement because each functional area of an organization holds the data.
- Confusion – since data is collected and maintained in so many different places, the same data may have different means in different parts of an organization.
- Difficulty in performing updates – to update a redundant data item, one must update all instances of the redundant item in all the department files of an organization. This is clearly hectic.
- Compromised system integrity.

(c)

- Comparison of the actual system performance against the anticipated performance objectives.
- The staffing needs and whether they are more or less than anticipated.
- Any delays in the processing and effects of such delays.

-
- Effectiveness of the inbuilt security procedures in the system.
 - The error rates for input data.
 - The output i.e. whether it is correct, timely and distributed correctly to the relevant users.
- (e)
- Economic of scale – it reduces the cost of hiring experts to some of the work which are technical.
 - Medicare: Four doctors able to serve many patients through AI – expert systems.
 - Important tool for teaching.

QUESTION SEVEN

- (a)
- (i)
- Its open-loop control system.
 - Soaking, washing and rinsing are operated on a timed basis.
 - Does not measure the output signal – the cleanliness of the clothes.
 - Output is not compared with the reference input.
- (ii)
- In closed loop systems, feedback, makes the system response relatively insensitive to disturbances and internal variations in system parameter.
- (b)
- (i)
- Most fourth generation systems use a mixture of graphics and text which eases the specification of user requirements.
 - Use of wimp – create a user friendly environment to the systems analyst.
 - Highly skilled experts not required less costly.
- (ii)
- Prototypes help users get an idea of what the system will look like, and make it easier for users to make design decisions without waiting for the system to be built.
 - In prototyping, a number of SDLC stages are not undertaken hence short time in system development.
- (iii)
- Using a case product, you can easily create professional readable data models without the use of paper, pencil, eraser and templates hence cut on costs. The models can be easily modified to reflect corrections and changes suggested by end-users. You don't have to start over.
 - Some case products can even help you analyse the data model for consistency, completeness and flexibility. The potential time and quality savings are substantial.
- (c)
- Allowing for immediate transactions (meaning the unbanked become banking customers).
 - An alternative to carrying cash which in turn means better cash retention.
 - Increased security and payment efficiencies
 - Reduced dependency on ATMs and branch infrastructures (meaning lowering of operating expenditure) etc.

QUESTION EIGHT

(a)

Network database

(b)

- Secure transactions
- Multiple access by customers
- Communication purposes
- For backing up reasons
- Resource sharing

(c)

Advantages

- Scalability
- Support large client population
- Most flexible of the database
- Optimizes resource utilization
- More secure – Enables identification and monitoring of real users

Disadvantages

- Complex and difficult to comprehend, modify or reconstruct in case of failure.
- Costly – initial costs and maintaining costs.

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QUESTION ONE

(a)

- Input, processing, storage, output
- Organization
- Environment
- Technology
- Feedback
- People

(b)

- Data sharing
- e-Business and Commerce
- e-Learning
- Communication
- Video conferencing

QUESTION TWO

(a)

- An approval from senior management is required after the completion of the first seven of the SDLC phases, annually during operations and maintenance phase and six months after the disposition phase.
- Senior management approval authority may be varied based on currency value, visibility level, congressional interests or a combination of these.

(b)

- (i) Economies of scale.
Use of resources in a pool makes it possible to save on costs especially for shared purchases which can be bought in bulk.
- (ii) Enforcement of systems development standards
- (iii) Sharing of information between departments. All users are given guidelines on systems to be developed i.e. tools to be used, level of testing required and implementation plans. Resources located in one place e.g. network printer can be shared by staff in one area.

(c)

- Customer name, number, items purchased, cost of the items, form of payment, Date of transaction, receipt number, Payment date, customer contacts.

QUESTION THREE

(a)

- Comparison of the actual system performance against the anticipated performance objectives. This involves assessment of system running cost, benefits etc. as they compare with estimated or anticipated.
- The staffing needs and whether they are more or less than anticipated.
- Any delays in the processing and effects of such delays.
- Effectiveness of the inbuilt security procedures in the system.
- The error rates for input data.
- The output i.e. whether it is correct, timely and distributed correctly to the relevant users.

(b)

(i) Parallel simulation

In which actual client data is processed using a copy of the client's software and is under the control of the auditor. The data processed on the auditor's copy of the software is compared to the data previously processed by the client to ensure that the processing is identical. This procedure provides evidence as to the effectiveness of design of programmed control procedures as well as aspects of the effectiveness of operation.

(ii) Embedded Audit Module

Is a CAAT in which code prepared by the auditor is embedded in the client's software. The code may be designed for example, to replicate a specific aspect of control procedure, or to record details of certain transactions in a file accessible only to the auditor. Thus, this audit software may be used as both a test control or as a substantive procedure. This CAAT is particularly applicable to continuous auditing.

(c)

- **Inconsistency:** There may be a problem when it comes to consistency in auditing since the systems are distributed hence part of the system may be audited and some parts may not hence —half baked auditing of systems may crop up leading to poor auditing.
- **Quality Tools:** System quality can be significantly enhanced by the use of quality tools. Lack of these tools may bring about difficulties in auditing systems. Some of the tools developed may not be tailored to suit distributed systems hence a challenge to system auditors where as some tools may not be easy to use or lack proper documentation.
- **Difficulty in Data Quality Audits:** It may be difficult for an organization to undertake regular data quality audits for the fact that data is distributed to some or all the components of a distributed system hence the difficulty to know what data is accurate, incomplete or ambiguous.
- **Size:** The size of a distributed system may be too large for an organization to fully and effectively carry out a successful audit. The possibility of redundancy auditing may bring about

QUESTION FOUR

(a)

- An expert system is an intelligent computer system which uses knowledge and interface procedures to solve problems that are difficult enough to require significant human experts for their solution.
- It is a computer-based system that simulates the human thought process or reasoning to solve problems which require human expertise. It enables non-experts in a given field to achieve comparable results to human experts in that field.
- In this context, the expert system will help in solving time in repairs and reduce cost drastically which would have incurred on the repair engineers.

(b)

- **Prototyping** is a technique for quickly building a functioning, but incomplete model of the information system using rapid application development tools. Prototypes typically evolve into the final version of the system or application.

Advantages of prototyping

- It is useful for projects in which user requirements are uncertain or imprecise.
- It encourages active user and management participation (as opposed to a passive reaction to non-working system models). This increases end-user enthusiasm for the project.

- Projects have higher visibility and support because of extensive user involvement throughout the process.
- Users and management see working, software-based solutions more rapidly than in model-driven development.
- Errors and omissions tend to be detected earlier in prototypes than in system models.
- Testing and training is a natural by-product of the underlying prototyping approach.
- The interactive approach is a more —natural fit because change is an expected factor during development.
- It reduces risk because you test the technical solution iteratively instead of making a wholesale commitment to any solution.

Disadvantages of prototyping

- There can be considerable pressure to implement an early prototype. Often users observing a working model cannot understand why the early prototype has to be refined further. The fact that the prototype has to be expanded to handle transaction volumes, terminal networks, back up and recovery procedures, as well as provide for audit ability and control is not often understood.
- It often leads to functions or extras being added to the system that are not included in the initial requirements document. All major enhancements beyond the initial requirements document should be reviewed to ensure that they need the strategic needs of the organization and are cost effective otherwise, the final system can end up being functionally rich but inefficient.
- The finished system will have poor controls. By focusing mainly on what the user wants and what the user uses, system developers may miss some of the controls that come out of the traditional system development approach, such a back up recovery, security and audit trails. Change control often becomes much more complicated with prototyped systems. Changes in designs and requirements happen so quickly that they are seldom documented or approved and can escalate to a point of being unmaintainable.

How this approach is used

Build the model to create the design. Then based on that model, develop the system with all the processing capabilities needed.

(c)

- Retrenchment of some engineers
- Some specialized positions would be faced out for instance some engineers may have acquired specialization due to many years of experience hence regarded special in position such positions may be faced out by the new system, leading to loss of status in the organization
- The new system may lower morals of those affected negatively by it.
- Repositioning of staff, some engineers may be assigned other responsibilities, which may be different from what they used to do and probably not in the engineering sector.

QUESTION FIVE

(a)

- Feasibility study: Preparation of gross estimates of developments, implementation and operation costs for each probable alternative solution.
- Development costs are one-time costs that will not recur after the project has been completed e.g. systems development, hardware/software, user training, site preparation and data conversion.
- Operating costs are costs that tend to recur throughout the lifetime of the system. E.g. maintenance, data storage expenses, communications expenses, software licenses. Such costs can be classified as:
 - Fixed costs – occur at regular intervals but at relatively fixed rates

- Variable costs – occur in proportion to some usage factor
- (b)
- Forward error control – additional redundant information is transmitted with each character or frame so that the receiver cannot only detect when errors are present, but can also determine where the error has occurred and thus corrects it.
 - Feedback (backward) error control – only enough additional information is transmitted so that the receiver can identify that an error has occurred. An associated retransmission control system is then used to request that another copy of the information be sent.
 - Ensures data integrity during data transmission.

QUESTION SIX

- (a)
- Infrastructure opportunities and constraints, which will include Information System requirements and priorities
 - Business processes: that is business focused processes, demand oriented and function based.
- (b)
- Hardware – The tangible parts of a computer system
 - Operating System – Gives life to the hardware
 - Database - stores data and information
 - Telecommunication – Enables communication between the users of the system and the organization system
- (c)
- In-house review: Evaluating what has been accomplished and resources that have been acquired
 - Analyzing the environment
 - Anticipating future development (projecting trends)
 - Deciding what goals are to be achieved (setting goals)
 - Deciding what actions to take to achieve the goal set

QUESTION SEVEN

- (a)
- (i)
- Use a single line for column heading to conserve space.
 - Adjust formats or eliminate information in order to fit the information to be displayed.
 - Place command buttons on the bottom
 - Always include the current time indicator
- (ii)
1. Define the output and data flows – before beginning a program, you must have a firm idea of what the program should produce and what data is needed to produce that output.
 2. Develop the logic. After you and the user agree to the goals and output of the program your job is to take that output definition and decide how to make a computer produce the output.
 3. Writing the code.
- (b)
- Printer – to produce text and graphics on paper.
 - Screen VDU it displays text and graphics on monitor
 - Computer output microfiche – it records reduced size information on sheet film known as microfiche

- Voice/audio devices – they convey information to the end-user from the computer in the form of speech.
 - Specialized devices – they produce outputs for specialized application e.g. electronic point of sale terminals, ATMs.
- (c) Systems development projects are usually triggered by:
- (i) Problems
 - (ii) Directives
- i) **Problems:** This is the business need(s) for the information system. Business reason(s) for the new information system due to change of trends.
- ii) **Directives:** The underlined steps, procedures and controls (standards in system development).

QUESTION EIGHT

- (a) **On-line fraud:** is any fraudulent behaviour with computerization by which someone intends to gain financial advantage.
- (b)
- Security measures taken by business;
 - Secure customer identification and authentication. Access to the e-banking service is controlled through the use of a customer number and password. The e-banking service uses the combination of these two codes to uniquely identify each customer.
 - **Guarantee of maximum secrecy in the transmission of data.** e-banking is hosted on, and supported by, a system which uses the most powerful encryption technology that is commercially available. The use of encryption guarantees that the information exchanged between your system and the e-banking system remain confidential and cannot be intercepted. Both the online submission of applications for subscribing to internet banking services and the electronic transactions conducted are protected using the highest encryption levels applied worldwide for this purpose.
 - **Digital certificates** – the use of digital certificates which are issued by trusted third parties, allow users to verify the identity of a system.
 - **Automatic log-out** the e-banking service has been designed so as to log you out of the system automatically, if the system has not been used for more than 5 minutes. This precaution aims to provide you with relative security in case you forget to disconnect, by preventing third parties from using the service in your place.
 - **Use of special purpose security software and mechanisms** – maximum care has been taken to ensure the security of the network as well as of the systems that support the service. In addition to encryption, the e-banking service is protected by multiple, state-of-the-art, special purpose security software systems such as firewalls and intrusion detection systems (IDS). At the same time, special emphasis has been placed on physical security, and for this purpose access to the e-banking systems allowed only to authorize employees of the bank.
 - **High availability** with the aim to offer a continuous, uninterrupted service to its customers, the banks have invested in technologies that ensure high availability levels for the e-banking service.
 - **Continuous security audits and checks against electronic fraud** – for guaranteeing the best possible service to you, the bank conducts daily audits of the e-banking infrastructure and application, checking for attempts or traces of security threats or electronic fraud. In parallel, and in co-operation with companies specializing in security, the banks conduct regular additional audits to confirm and enhance the security of this particular infrastructure.
 - **Protection of personal data.** Acquisition and processing of your personal data and account details is performed by the banks with the utmost care and only to the extent

required for the services provided. The banks continuously sees to it that your personal data are secure, in compliance with Laws 2472/1997 and 2774/1999, and with all additional ordinances, circulars and directives issued by the Hellenic Data Protection Authority and by any other national or European Community authority.

- **Security measures taken by individuals protect your e-banking service password.** Try to memorize your password, and destroy any document on which it is printed. Customers are held liable for all the transactions conducted using the customer numbers and passwords regardless of whether the natural persons who conducted such transactions were the customers themselves or not. Therefore, protecting your password is very important.
- Never disclose in any way whatsoever (e.g. orally, in writing, via e-mail) your password to third parties.
- Password that you originally receive is valid only for the first time you log into the system. After you enter your customer number and password for the first time, the system will prompt you to change your password. Select a password that is difficult to figure out; this should be composed of 6 to 8 digits, of which at least one should be a letter of the alphabet. Avoid using your name, your date of birth or information that is characteristic of you or of those close to you.
- If you believe that a third party may have found out your password, contact immediately the Direct Banking Customer support centre.
- **Check the digital certificate** in order to be sure that you are connected to the e-banking system. You should check the identity of the system by checking its digital certificate.
- **Check your account** if you observe in your monthly account statement any activities which do not remember to have made, contact immediately the Direct Banking Customer Support.
- **Follow the log-in and log-out procedure** you should always follow the log-in and log-out procedure for connecting to, and disconnecting from the e-banking system, especially if you are using a computer that is also available to other users.
- **Protect your PC against viruses** – you should protect your PC against computer viruses, which are mainly spreading through email messages, by installing an anti-virus application on your PC. You should also remember to regularly update this application in accordance with the instructions of its manufacturers.
- **Configure your PC for Enhanced Security** – this will assist to keep off hacker and any other unauthorized user to the system.

Part III: Comprehensive Mock Examinations

QUESTIONS - MOCKS

The following are three MOCK papers that address the major areas of the syllabus. It is recommended that candidates attempt the questions in an examination condition and then revise their answers using the suggested answers that follow.

Instructions:

Answer any FIVE questions. Note that marks allocated to each part of the question are shown at the end of the question.

Questions in this part are selected from across the topics in the entire syllabus. It will be important for the candidate to try and relate the questions to the appropriate topic or sub-topic of the syllabus.

Each question carries a total of 20 marks.

Time Allowed: 3 hours

Paper 1**CPA PART II****SYSTEM THEORY AND INFORMATION COMMUNICATION TECHNOLOGY****Time Allowed: 3 hours****Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.**

QUESTION ONE

- a) Office automation has revolutionised the office environment empowering the office worker to increase their productivity.
 - i) Define office automation and show its impact on the business (4 marks)
 - ii) Define Desktop Publishing (DTP) and indicate the business applications of the systems? (4 marks)
- b) What are the major limitations of manual systems? (4 marks)
- c) Modern banking environments have greatly benefited from developments in Electronic Data Interchange (EDI) and electronic funds transfer. Explain EDI and EFT and show their contribution to better business transactions. (4 marks)
- d)
 - i) What do you understand by the term Document Image Processing (DIP)? (1 marks)
 - ii) Identify the main applications of DIP and state three advantages of using DIP in information management. (4 marks)

QUESTION TWO

Different organisations have adopted different structures for the IT department.

Outline the traditional structure of an IS department and explain the main activities of the key sections. (20 marks)

QUESTION THREE

- a) Outline the advantages and disadvantages of centralisation and decentralisation of the IS function (6 marks)
- b) Outsourcing can be defined as the process of turning partially or fully an organisation's IT services to external entities. Discuss the merits and demerits of outsourcing the IS function in an organisation. (6 marks)
- c) List any FOUR features that would define quality software being developed (4 marks)
- d) State the any FOUR rules for system testing (4 marks)

QUESTION FOUR

- a) Explain how the following concepts of performance and workload measurements are used in assessing the performance of systems. (6 marks)
 - i) Response time
 - ii) Turnaround time
 - iii) Throughput
- b) What is the role of computer monitors in measuring the performance of a system (6 marks)
- c) Explain the main types of maintenance that a system may undergo in its lifespan (8 marks)

QUESTION FIVE

- a) In delivering information services, there are three alternative approaches to managing the costs of IT. Identify and briefly discuss the three alternatives (9 marks)
- b)
- i) What do you understand by the term feasibility study? (1 mark)
 - ii) Briefly explain these areas of feasibility study. (8 marks)
- c) Define quality assurance as used in information systems (2 marks)

QUESTION SIX

- a) The systems development lifecycle (SDLC) is a model that outlines the stages in the development of a system. It acts as a guideline for system development. Outline the key stages of SDLC. (8 marks)
- b) With developments in end user computing in many organisations, it has become increasingly necessary that organisations have information centres. What are the key services provided by these centres? (12 marks)

QUESTION SEVEN

- a) Define the following terms as they relate to systems testing.
- i) Dynamic and static testing (4 marks)
 - ii) Performance testing and usability testing (4 marks)
 - iii) Regression testing (2 marks)
 - iv) User acceptance testing (2 marks)
- b) Computer Aided Software Testing (CAST) provides some of the automated tools to support systems and user acceptance testing.
- i) What areas would CAST be useful? (6 marks)
 - ii) State any two problems of CAST. (2 marks)

QUESTION EIGHT

- a) What is a project? (3 marks)
- b) What is the role of the following in project management? (2 marks)
- i) Project manager
 - ii) Project sponsor
- c) Identify the major challenges facing project management (5 marks)
- d) Explain the phases of the project lifecycle. (5 marks)
- e) Define the Internet and outline its key services. (5 marks)

Paper 2**CPA PART II****SYSTEM THEORY AND INFORMATION COMMUNICATION TECHNOLOGY****Time Allowed: 3 hours****Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.**

QUESTION ONE

- a) Computer hardware and software are usually supplied separately. However, the process of evaluation and acquisition should be related to each other as the functioning of each depends on the other. Usually, companies develop an invitation to tender (ITT) which provides guidelines for the tendering process.

Required:

Outline the contents of an ITT. (8 marks)

- b) Explain the following terms as they relate to data storage: (2 marks)
- i) Archiving
 - ii) Back-up
- c) What do you understand by the term audit trail? (2 marks)
- d)
- i) The Data Protection Act 1998 gives individuals seven specific rights in respect of personal data held about them by others. Briefly outline any four of these the rights. (4 marks)
 - ii) What controls must a company have to ensure its compliance with the requirements of Data Protection Act? (4 marks)

QUESTION TWO

- a) At the start of a project, a Project Initiation Document (PID) may be drawn up setting out the terms of reference for the project. Outline the contents of a PID (6 marks)
- b) Outline the duties and responsibilities of the project manager (10 marks)
- c) Many modern information systems utilise multimedia technology to deliver information products to users. Explain giving the main applications of multimedia (4 marks)

QUESTION THREE

- a) MIS projects if not well managed can fail. What causes project failure? (6 marks)
- b) What could lead to changes to the original project plan? (4 marks)
- c) What is the role of the accountant in IS management, delivery and quality assurance (4 marks)
- d) State the THREE advantages and THREE disadvantages of using CASE tools in the systems development process. (6 marks)

QUESTION FOUR

- a) Identify the main participants in the systems development process (6 marks)
- b) In fact finding for systems development a number of techniques for investigating and recording user requirements exist. State the four main techniques. (4 marks)
- c) What could form the source of information for developers of a new system? (4 marks)
- d) After the system is operational, post-implementation evaluation performed. How is this conducted and what is its significance? (6 marks)

QUESTION FIVE

- a) With the aid of an appropriate example, explain the following tools for documenting and modelling user requirements
- i) Data Flow Diagrams (2 marks)
 - ii) Structured English statements (2 marks)
 - iii) Decision tables (2 marks)
 - iv) Decision trees (2 marks)
- b) How is the data dictionary important to the design of systems? (4 marks)
- c) Using a representative graphical entity-relationship model describe the purpose and notation of this model using a simple example; and explain why the ER-model improves the definition of user requirements. (4 marks)
- d) Kazi Ltd uses a computer program to compute wages for casual workers. This involves multiplying the hours worked with the fixed hourly rate. There is a tax charge of 15% on Gross Pay of 25,000 and over, tax of 10% is charged on pay 10,000 and above and no tax for Gross pay less 10,000. Net pay is computed as Gross Pay less Tax. Present this information in a detailed flow chart. (4 marks)

QUESTION SIX

It is important that information systems designers develop user interfaces that are flexible and which accommodate the different human perceptions.

- a) Provide a guideline for effective data entry screen design. (5 marks)
- b) Identify the common ways in which users interact with and control computer systems. (4 marks)
- c) Batch and online data capture are two main methods of data entry methods. Explain what batch and online capture mean and relate these to source data automation. (6 marks)
- d) Computer Aided Software Engineering (CASE) tools are used systems development process. Explain the importance of CASE to systems development. (5 marks)

QUESTION SEVEN

Organisations can acquire IT software through in-house development (bespoke) or they can purchase off-the-shelf (software package approach) packages.

- a) Explain the relative merits and demerits of the software package approach in acquisition of systems. (12 marks)
- b) What are the main reasons why a company would choose to buy a software package? (5 marks)
- c) What do you understand by the term prototype? What is the relevance of prototyping to systems development? (3 marks)

QUESTION EIGHT

- a) The MIS project team comprises people who report directly or indirectly to the project manager. The team has a major role to play in the success or failure of the project.
- i) State the factors to consider when constituting a project team (5 marks)
 - ii) Outline the methods of monitoring and reporting progress (5 marks)
- b) Briefly explain the following classifications of systems. (4 marks)
- Closed and open systems
 - Deterministic and probabilistic systems
- ii) State the features of systems theory (6 marks)

Paper 3

CPA PART III

SYSTEM THEORY AND INFORMATION COMMUNICATION TECHNOLOGY

Time Allowed: 3 hours

Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- a) Companies typically buy software licenses for packages they use for their operation. What should a software license cover and what should companies check in their set-ups so as not to infringe on copyright law? (8 marks)
- b) A risk is a quantified assessment of potential loss. Where risk cannot be totally avoided it must be managed. What does risk management entail? (6 marks)
- c) A threat is a potential danger to a component of the information system that may modify or destroy it. Identify the special characteristics of computer systems that cause extra problems for control over systems. (6 marks)

QUESTION TWO

- a) Define contingency planning and outline the contents of a contingency plan. (8 marks)
- b) In ensuring control over the IS department resources, the company can adopt physical or logical access controls. With appropriate examples, explain the two forms of control. (6 marks)
- c) Define the following terms as they related to information systems. (6 marks)
- i) Hackers
 - ii) Viruses

QUESTION THREE

- a) State the characteristics of a quality software product (6 marks)
- b) Explain the following terms as they relate to systems development:
- i) Quality management (2 marks)
 - ii) Quality assurance (2 marks)
 - iii) Quality control (2 marks)
- c) In assessing the economic feasibility of MIS projects, it is important to identify the costs and benefits of New Systems. Identify Costs and benefits of new systems (8 marks)

QUESTION FOUR

- a) Explain the following tools for documenting and modelling user requirements
- i) Entity-relationship diagrams (ERDs) (3 marks)
 - ii) Entity Life Histories (3 marks)
- b) What are the desirable characteristics of a user-friendly system (6 marks)
- c) Common computer outputs include printed reports and on screen reports. Explain the main classifications of reports. (8 marks)

QUESTION FIVE

- a) The systems implementation stage of SDLC involves getting the new system into use as smoothly and quickly as possible. Briefly explain the main activities in the implementation stage. (12 marks)
- b) Fourth Generation Languages (4GLs) make rapid applications development faster for many programmers. What are 4GLs? (2 marks)
- c) It has been suggested that for any business to derive strategic advantage from information systems there has to be alignment between the business strategy and the IS/IT strategy. Define what a business strategy for IT is and show why it is important for organisations to have an IS/ IT strategy. (6 marks)

QUESTION SIX

- a) Project management software can offer useful tool for managing projects.
- Identify the functions of project management software (4 marks)
 - What are the typical inputs required for the software? (4 marks)
 - Outline the major merits and demerits of using a project management software in the project management process (6 marks)
- b) Outline the key steps in the systems acquisition process (6 marks)

QUESTION SEVEN

- a) Before systems are put into organisational use, they should be well tested to ensure that the system being delivered is working as expected before it is implemented.
- What factors would determine the scope of system testing? (4 marks)
 - Who are involved in the testing process? (3 marks)
 - What do you consider to be limitations of software testing? (5 marks)
- b) Decision support systems (DSS) are ISs that support managers in arriving at decisions in semi-structured problems. State any FOUR characteristics of DSS. Identify too the THREE main components of the DSS. (8 marks)

QUESTION EIGHT

- a) The computerisation process of the **Strath-Times Investments** has been estimated in the table provided.

ACTIVITY	DURATION (weeks)	PREDECESSOR	Normal cost (KSh.)
A	9	B,K	3,000
B	5	E,D	2,000
C	4	J,L	5,000
D	7	M,N	4,000
E	3	M,N	5,000
F	4	J,L	3,000
G	4	F,A	4,000
H	6	B,K	3,000
I	8	E,D	500
K	10	D	400
L	6	B,K	3,000
M	4	-	2,000
N	2	-	1,000
		TOTAL	35,900

- a)

-
- i) Draw a network chart (CPM) and determine the critical path and duration of the project. (10 marks)
- ii) Given that the company experiences an additional weekly site cost of Ksh.400, compute the total cost of the project. (4 marks)
- b) **Strath-Times Investments** has decided to develop its own programs in-house. The initial cost of the project is estimated at Ksh. 200,000.

If the estimated cash flow from the time of implementation of the system is estimated at Ksh. 120,000; 60,000; and 120,000 respectively, compute the **payback period** and **net present value** (NPV) of the project. The current cost of capital is 12%. Comment on the viability of the project. (6 Marks)

MOCK 4 QUESTIONS

CPA PART III

SYSTEM THEORY AND INFORMATION COMMUNICATION TECHNOLOGY

Time Allowed: 3 hours

Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

Kasuku Engineering Co. Ltd, a company that is involved in the design and manufacturing of various products realizes that, in order to remain ahead of its competitors, it must introduce **Computer Aided Design (CAD) techniques**.

Required:

- a) Define what is meant by 'Computer Assisted Design' techniques. (2 marks)
- b) List and describe briefly FOUR potential benefits, the company is likely to experience in the adoption of CAD. (8 marks)
- c) List five physical security procedures that Kasuku might adopt to make sure that its information is secure. (10 marks)

(Total: 20 marks)

QUESTION TWO

In data communication, the communication channel is the route along which data is transmitted. The transmission of data can be described by the following four characteristics:

- A. Direction of flow of data.
- B. Communication lines.
- C. Speed of data transmission.
- D. Mode of data transmission.

Required:

For each of the following data communication concepts/devices, indicate under which ONE of the above listed characteristics A-D they would best fall:

- ii. Protocol;
- iii. Half duplex;
- iv. Fibre optics;
- v. Simplex;
- vi. Analog signal;
- vii. Micro wave;
- viii. Band width;
- ix. Start/stop bit;
- x. Voice bad. (10 marks)

Explain the term internetworking within the context of data communication. (5 marks)

How does a call-back unit and data-encryption equipment enhance security in a computer network? (5 marks)

(Total: 20 marks)

QUESTION THREE

Explain the following:

- (a) Microprocessor.

- (b) Distributed data processing.
- (c) Direct access backing storage. Give examples.
- (d) Batch processing.
- (e) Time sharing.

(20 marks)

QUESTION FOUR

The introduction of a computer-based information system in an organization can generate some amount of fear and reluctance to change on the part of users.

Required:

- (a) List six major reasons for such user resistance.
For each reason, provide a brief explanation.
- (b) How can this problem of user resistance to change be solved?

(12 marks)

(8 marks)

(Total: 20 marks)

QUESTION FIVE

Distinguish between the following pairs of terms:

- (a) A closed system and an open system.
- (b) A deterministic and a random system.
- (c) An open-loop system and a closed-loop system.
- (d) A human system and a machine system.

(20 marks)

QUESTION SIX

Accompanying the use of computerized operations in a business are a host of means by which fraud can be committed. This has given rise to various counter measures to enhance security of computer systems.

Required:

- (a) List six methods and tools that are useful in stemming computer fraud by employees.
- (b) Explain how theft of computer time by employees (unauthorized use of the firm's computer) can be minimized.

(12 marks)

(8 marks)

(Total: 20 marks)

QUESTION SEVEN

- (a) Distinguish between a system flowchart and a program flow chart.

(6 marks)

- (b) The payroll system for a company is given in the narrative below:

—When a person is hired, the company manager prepares an employment form and deductions slip. These are forwarded to the payroll clerk. Each week employees hand in timecards showing hours worked to the payroll clerk. Every four weeks the payroll clerk completes earnings and deductions for each employee and payroll taxes for the company. This detailed information is then forwarded to the cash disbursements clerk who:

- (i.) Prepares the pay cheque.
- (ii.) Enters the payroll transactions in the cash disbursements journal.
- (iii.) Sends pay cheques back to the payroll clerk.

Employees year-to-date earnings and deductions are then updated by the payroll clerk and cheques distributed to the employees.¶

Required:

Draw a system flowchart for the payroll system described above.

(14 marks)

(Total: 20 marks)

QUESTION EIGHT

- (a) (i.) What is a Decision Support System (DSS)?
(ii.) Describe the major DSS software components. (10 marks)
- (b) (i.) What is an expert system?
(ii.) List four advantages of using an Expert System in decision making. (10 marks)

MOCK 5 QUESTIONS

CPA PART III

SYSTEM THEORY AND INFORMATION COMMUNICATION TECHNOLOGY

Time Allowed: 3 hours

Answer any FIVE questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

- a) List five types of systems (5 marks)
- b) Explain the following characteristics of a system:
- (i.) Differentiation;
 - (ii.) Equifinality;
 - (iii.) Feedback;
 - (iv.) Transformation;
 - (v.) Entropy; (5 marks)
- c) (i) State two features of classical theories of organizations.
 (ii) State two features of the human relations theories of organizations.
 (iii) State one feature of the contingency approach to organizations. (10 marks)
- (Total: 20 marks)**

QUESTION TWO

Define each of the following fact finding techniques and explain when it is likely used:

- (i.) Observation; (4 marks)
 - (ii.) Questionnaires; (4 marks)
 - (iii.) Searching records; (4 marks)
 - (iv.) Interviews; (4 marks)
 - (v.) Statistical sampling; (4 marks)
- (Total: 20 marks)**

QUESTION THREE

- (a) Information is a vital resource and most organizations are investing heavily in its management. It is therefore critical to protect data and information from accidental or deliberate unauthorized modification or destruction. The information system itself must be protected from unauthorized interference so that it continues to meet its objective of continuing to provide information to various users.

Required:

- (i.) Make two recommendations on physical security measures your organization's information system (2 marks)
 - (ii.) Explain how —Backup and —Uninterruptible Power Supply are security measures. (2 marks)
 - (iii.) Discuss two security features that most operating systems have. (2 marks)
 - (iv.) Name two disasters that information systems should be guarded against. (2 marks)
 - (v.) Why do you think an information security policy is necessary for your organization? (2 marks)
- b) Computer viruses pose a danger to the integrity of micro-computer systems. Fortunately a variety of anti-virus tools are available to detect, identify and remove viruses using a wide range of techniques.
- Required:**
- (i.) What is a computer virus? (2 marks)

- (ii.) Name two anti-virus tools. (2 marks)
- (iii.) Suggest two administrative measures that your organization should take to check the threats of computer viruses. (4 marks)
- (iv.) Name two environmental factors that should be controlled so that they do not affect the operation of the computer. (2 marks)

(Total: 20 marks)

QUESTION FOUR

Onyango Wholesalers Ltd. Provides a variety of goods to customers in Nairobi. The wholesale business is owned and managed by Mr. Danson Onyango. Mr. Onyango purchases goods on credit from his well established suppliers. He has a large box-file containing supplier details and another equally large one containing commodity details. The commodity file also indicates the levels of inventory held in the store.

When a customer makes his order, the sales office accesses the commodity file to check if there is sufficient stock of the required items. If there is sufficient stock, then the sales office prepares a delivery note which is forwarded to the accounts office where an invoice is prepared. The invoice and the delivery note accompany the goods from the store to the customer who prepares a payment cheque for Onyango Wholesalers Ltd.

A copy of the delivery note is filed in the commodity file which now shows that the stock has reduced by the amount delivered to the customer.

Sometimes the stock of the required item is not sufficient to service the customer order. In this case the supplier's file is accessed to select the supplier that Onyango Wholesalers Ltd.

Will order from. The sales office then produces purchase orders and dispatches them to the selected supplier. The supplier prepares his own invoice and delivery note which accompany the ordered goods to the stores of Onyango Wholesalers Ltd. Once received, the invoice is forwarded to the accounts office for payment to the supplier. The delivery note is used to update the commodity as well as the supplier details files.

Required:

- a) In what ways can a business organization be considered as a system? Derive illustrations from Onyango Wholesalers. (10 marks)
- b) Draw a Data Flow Diagram (DFD) to show the data flow, processing, inputs, outputs, sources and destinations at Onyango Wholesalers Ltd. (10 marks)

(Total: 20 marks)

QUESTION FIVE

Explain each of the following micro computer hardware/software devices:

- (a) Cache memory; (4 marks)
- (b) Coprocessor; (4 marks)
- (c) Device driver; (4 marks)
- (d) Disk caching; (4 marks)
- (e) Expansion card; (4 marks)

(Total: 20 marks)

QUESTION SIX

- (a) Explain the following categories of systems in connection with management decision making, clearly distinguishing between the categories:
 - (i.) Transaction processing systems; (3 marks)
 - (ii.) INFORMATION COMMUNICATION TECHNOLOGY; (3 marks)
 - (iii.) Decision Support Systems; (3 marks)
 - (iv.) Executive Support Systems; (3 marks)

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- (b) Identify and briefly explain the three fundamental components of an expert system.
Explain how an expert system may be used in a business application. (8 marks)

(Total: 20 marks)

QUESTION SEVEN

- (a) Explain the meaning of the term protocol in computer networks. (3 marks)
- (b) Describe the use of the following devices in computer networks:
(i.) Multiplexors;
(ii.) Acoustic couplers;
(iii.) Line concentrators; (6 marks)
- (c) (i.) Explain how Integrated Systems Digital Network (ISDN) may be used in a business organization? (5 marks) (ii.) Describe the type of computer network you would recommend for a large, country wide, commercial bank, with heavy data processing requirements at its four regional centers. (6 marks)

(Total: 20 marks)

QUESTION EIGHT

The fastest growing area of computing is end-user computing especially the area of end-user application development which is based on the fourth generation languages (4GLs).

Required:

- (i.) Describe five major features of a fourth generation language. (10 marks)
- (ii.) Discuss the advantages to an organization in having users involved in developing information systems applications. (10 marks)

(Total: 20 marks)

ANSWERS - MOCKS**SUGGESTED ANSWERS TO MOCK EXAMS****SOLUTIONS FOR PAPER 1****QUESTION****ONE a)****i) Office automation**

Office automation entails the use of IT to collect, process, store, manipulate and disseminate information. Involves technology for electronic publishing, document management, copying systems, DTP.

Effect on Business:

- Greater speeds, volumes and accuracy in routine processing.
- Improved quality of management information.
- Organisational commitment to continual change.
- Better customer service.
- New staff issues.
- Home-working.

ii) Desktop Publishing (DTP) and the business applications of the systems

DTP is the use of office computers to implement computerised typesetting and composition systems. DTP systems pull graphics and text together from other programs. DTP's main function is to enable the page to be seen as the artwork image for editing and production. Some common DTP packages include: PageMaker, Illustrator, Corel Draw, Photoshop.

Business applications of DTP include:

- i) Design and preparation of the management reports, annual report.
- ii) Design of external documentation e.g. press releases.
- iii) Design of advertisements.
- iv) Publication of in-house magazines.
- v) Design of the organisations standard documentation e.g. order forms.

b) Major limitations of manual systems

1. Lower labour productivity.
2. Slower processing.
3. Greater risks of errors.
4. Less accessible information- imagine looking for a physical file in a registry.
5. Difficulty in making corrections and alterations.
6. Less consistent quality of output.
7. Bulky handling and storage e.g. in registries- taking up a lot of space.

c) Electronic Data Interchange (EDI)

EDI is a form of computer-to-computer data interchange that is a form of electronic mail. It mainly involves business documents and helps in accomplishing transactions e.g. sending invoices.

Organisations have an agreed format for the electronic documents so that they are recognised by all parties to the transaction.

Example: EDIFACT (Electronic Data Interchange For Administration, Commerce and Transport).

TECHNOLOGY

- **ELECTRONIC FUNDS TRANSFER (EFT).**

This is a system whereby a computer user can use his/ her computer system to transfer funds to another account from his bank account by sending electronic data to his bank. It must involve the banks themselves.

An example is SWIFT (Society for Worldwide Interbank Financial Telecommunications.)

ELECTRONIC FUNDS TRANSFER at POINT OF SALE (EFTPOS): Aims to handle, electronically, the high volume, low value transactions which make up the bulk of payments by number which banks currently have to handle and process in paper form. EFTPOS systems integrate the retailer's POS system, which may comprise bar-code scanning or a sophisticated computerised cash register, with an electronic payment system.

d)

- i) **Document Image Processing (DIP)**

DIP is an electronic form of filing. In a DIP system, a document is passed through a scanner, translated into digital form and the digitised image is then stored on a storage device usually an optical disk.

- ii) **Applications of DIP include:**

- a. Electronic data interchange.
- b. Desktop Publishing.
- c. Management of accounting transactions.

Advantages of DIP are:

- 1. Reduced space needed for files. One optical disk can contain 60000 pages of A4.
- 2. Simultaneous viewing of files by many users.
- 3. Faster retrieval of files.

QUESTION TWO

Traditionally the IS department was divided into three main areas. These were:

- Systems development
- Operations
- Systems support

The managers of these areas were answerable to the information technology manager. The responsibilities of the information technology manager included:

- Giving advice to managers on all issues concerning the information technology department;
- Determining the long-term IT policy and plans of the organisation;
- Liaisons with external parties like auditors and suppliers;
- Setting budgets and deadlines; and
- Selecting and promoting IT staff.

1. Systems development

The systems development manager is responsible for the offline development of systems and their implementation. He assigned projects to the analysis and programming teams.

The analysis section

Functions include:

- System investigations;

- System design;
- System testing;
- System implementation; and
- System maintenance.

The programming section

Functions included:

- Writing programs;
- Testing programs; and
- Maintaining programs.

System programmers write and maintain system software. Application programmers wrote programs or customised software to carry out specific tasks.

2. Operations

The operations manager is responsible for the efficient day-to-day running of the computer operations and the operating staff. Duties include:

- Planning procedures, schedules and staff timetables;
- Contingency planning;
- Supervision and co-ordination of data collection, preparation, control and computer room operations; and
- Liaising with the IT manager and system development manager.

Data preparation

Data preparation members of staff are responsible for converting data from source documents to computer sensible form. They usually operated a key station to prepare data. Duties were:

- Correctly entering data from source documents and forms;
- Keeping a record of data handled; and
- Reporting problems with data or equipment.

Data control

Data control staff are generally clerks. Duties include:

- Receiving incoming work on time;
- Checking and logging incoming work before passing it to the data preparation staff;
- Dealing with errors and queries on processing; and
- Checking and distributing output.

Computer room

The computer room manager's duties include:

- Control of work progress as per targets;
- Monitoring machine usage; and
- Arranging for maintenance and repairs.

The shift leader's duties included:

- Scheduling work for the shift;
- Supervising the work;
- Ensuring a proper operations log was kept; and
- Liaising with the operations manager.

The computer operators control and operate hardware in the computer room. Their duties include:

- Starting up equipment;
- Running programs;
- Loading peripherals with appropriate media; and
- Cleaning and simple maintenance of equipment.

The file librarian keeps all files organised and up to date. Typical duties are:

- Keeping records of files and their use;

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- Issuing files for authorised use; and
- Storing files securely.

The database section

The database administrator is responsible for the planning, organisation and control of the database. His functions include:

- Co-ordinating database design;
- Controlling access to the database for security and privacy;
- Establishing back-up and recovery procedures;
- Controlling changes to the database;
- Selecting and maintaining database software; and
- Meeting with users to resolve problems and determine changing requirements.

3. Support

The maintenance section

- Fixing software and hardware problems

The network section

The network administrator/controller/manager's functions include:

- Assignment of user rights;
- Creating and deleting of users;
- Training of users;
- Conflict resolution; and
- Advising managers on planning and acquisition of communication equipment.

QUESTION THREE

a) Centralisation

Advantages of centralisation

- Better security and control
- Better management of information
- Economies of scale e.g. in acquisitions- discounts
- More expert staff
- No redundancy

Disadvantages

- Delayed responses
- Single point of failure
- Over reliance on the head office.

Decentralisation

Advantages of decentralisation

- Tailored to local needs
- Better local control
- Restricted breakdowns

Disadvantages

- Uncoordinated information systems
- Lack of free information flows
- Redundancies

b) Merits and demerits of outsourcing the IS function in an organisation

Advantages of outsourcing

- Cost control due to fixed prices.
- Greater certainty in long term planning.
- Economies of scale

- New skills and knowledge become available.
- Resources employed can be scaled up or down depending on the needs.

Disadvantages.

- Risks of information confidentiality/ security
- Loss of competitive advantage- trade secrets.
- Getting locked into an unfavourable arrangements- contracts.

c) Features of quality software:

- Reasonably bug-free
- Delivered on time
- Written within the budget
- Meets user satisfaction
- Meets quality control standards

d) Rules for system testing

- Always test software against a specification- testing without a specification implies there is no need for testing as nothing of value is being tested
- Document the testing process
- Use different forms/ techniques of testing- dynamic and static
- Test positively, checking that the software does what it should do and that it does not do what it should not
- Have the right attitude toward testing- it should be a challenge not just a routine

QUESTION FOUR

a) Concepts of performance and workload measurements

Response time

Response time is the overall time between a request for system activity and the delivery of the response

Response time includes three elements:

- The time necessary to transmit or deliver the request to the system
- The time the system needs to process the results
- The time it takes to transmit or deliver the results back to the user

Response time is critical for user satisfaction

Turnaround time

- Turnaround time measures the efficiency of centralised computer operations, which still are used for certain tasks, such as credit card processing
- Turnaround time is the amount of time between the arrival of a request at a computer centre and the availability of the output for delivery or transmission

Throughput

- Throughput measures the efficiency of the computer itself
- Throughput is the time from the input of a request to the central processor until the output is delivered to the system

b) The role of computer monitors in measuring the success of the system

This can serve as an automated means of system evaluation. They include:

- a) Hardware monitors. These measure the presence or absence of electrical signals in selected computer hardware circuits. They measure idle time or levels of activity in the CPU or peripherals.
- b) Software monitors. These interrupt the application in use a record data about it e.g. waiting time during program execution.
- c) System logs. These provide useful information
 - Unexplained variations in job running times

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- Excessive machine downtime
- Efficiency of mixed workloads

c) **There are four types of maintenance:**

Corrective maintenance

This occurs when there is a system failure. The objective is to ensure that the system remains operational.

- Diagnoses and corrects errors in the system
- Investigation, analysis, design, and testing are necessary before a solution is implemented
- Typically, a user submits a systems request form with supporting evidence, if necessary

Adaptive maintenance

This is undertaken in response to anticipated changes in the processing environment to add new capability and enhancements

- Adds enhancements to the system
- An enhancement is a new feature or capability
- Adaptive maintenance often is required in a dynamic business environment
- An adaptive maintenance project is like a mini-SDLC, with similar phases and tasks
- Can be more difficult than new systems development, because of the constraints of an existing system

Perfective maintenance

This occurs to improve the system by eliminating processing inefficiencies or enhancing performance. Involves changing an operational system to make it more efficient, reliable, or maintainable

- Requests for corrective and adaptive maintenance typically come from users, while requests for perfective maintenance typically come from the IS department

Preventive maintenance-

Undertaken to avoid future occurrences that may be detrimental to the system e.g putting a firewall to a system to avoid hacking into the system.

QUESTION FIVE

a) **Charge back systems**

IT as a corporate overhead

IS costs are treated as an administrative overhead.

Merits:

- Simple and cheap to administer.
- Encourages innovation and experimentation.
- Minimal conflict between IT and user departments

Demerits:

- No incentive to control costs
- No responsible use of IT

IT charged out on a cost basis (Cost based charge-out)

Users are charged for the costs of IT in proportion to their usage.

Merits

- Conceptually simple.
- Cost control by responsibility
- Motivation to regulate costs.

Demerits

- Inefficiencies of the IS department may be passed on to users
- Complex to implement in practice.
- Difficulty in determining appropriate cost units.
- Overhead costs of IT department still need to be met.

Market based charge-out.

IT department acts as a profit centre.

Merits

- External standards and price available.
- Encourages an entrepreneurial attitude.
- Prices are negotiable.

Demerits

- No comparable services might exist
- May result in under utilisation of resources
- Management skills may be lacking in IT

a)

- i) Feasibility study is a preliminary study carried out to determine if the system development warrants proceeding or not. A system is feasible if it helps the organisation meet its overall objectives.

ii) Areas of feasibility study

- **Technical feasibility.** Can the system be constructed using available hardware and software. Consider transaction volumes, file capacities, response times and concurrent users.
- **Operational feasibility.** That the system does not interfere with how the organisation does its business. Consider management responsibilities, chains of command, reporting structures and levels of reorganisation required.
- **Social feasibility.** System does not result in a net decline in the interests of stakeholders. Consider personnel policies, job specifications, industrial relations, skill requirements and motivation.
- **Economical feasibility.** The proposed benefits of the system exceed its estimated costs. Is the project a good investment?

b) Quality assurance

Quality assurance is the term used where a supplier guarantees the quality of goods to be delivered and allows the customer to assess the quality of goods while they are being manufactured. In software development, there is use of structured walkthroughs.

QUESTION SIX**a) The stages outlined by the SDLC model are:**

- **PROBLEM IDENTIFICATION.** Systems are developed to achieve certain specific goals. The identification of a problem and its clear precise definition act as a strong basis for the formulation of the goals of the system.
- **FEASIBILITY STUDY.** This is a preliminary study carried out to determine if the system development warrants proceeding or not. A system is feasible if it helps the organisation meet its overall objectives- economic, technical, social, organisational.
- **SYSTEM INVESTIGATION.** A new system almost inevitably replaces an already existing one. The system investigation is a thorough examination of the existing system as a means of clearly documenting it in totality. Various methods used include interviews, questionnaires, observation and searching documents.
- **SYSTEM ANALYSIS.** This is a thorough examination of the documented system to determine its strengths and weaknesses, opportunities and threats as a means towards providing inputs for the design stage.
- **SYSTEM DESIGN.** This is the development of the logical structure of the new system that will solve the problem defined in the first stage. It occurs at various levels and mirrors the system components namely input, output, processing and files.

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- **SYSTEM IMPLEMENTATION.** This is the actual realisation of the system design as a real, working system. Choices need to be made as to whether the system will be constructed or purchased. Other relevant issues are the installation, testing, training, file conversion and the actual changeover.
- **REVIEW AND MAINTENANCE.** Two types of reviews are carried out i.e. the post implementation review and the system evaluation. System maintenance comes in three forms namely corrective, adaptive, perfective and preventive.

b) Information centres

The concept of a computer support group to provide information workers with guidance and training in computer use as well as hardware and software tools evolved in the 1970s and 1980s. This was aimed at maximising the efficiency and effectiveness of computer processing.

A number of terms have since emerged to describe the service centre ranging from client service centre, resource centre. However the term information centre was coined by IBM Canada and is the most widely used today.

An information centre is designed to support end users in a number of ways. The typical services offered by an information centre include:

1. Problem resolution

The centre acts as helpdesk for different users who may seek information ranging from simple queries on some of the error messages encountered to appeals for help when systems malfunction. There will always be expert assistance to sort out the problems.

2. Training of users

This entails enhancing computer literacy among various system users. Personnel from the information centre may be handy in introducing users to new programs and also offering specialised skills to other departments during implementation of new programs.

3. Consultation

The role of a consultant in the information centre is to help end-users plan for effective use of their computing resources, to advise them in ways to computerise their work, and evaluate proposed computer applications, to assist in product selection and address questions regarding software and hardware.

4. Technical support

This is provided by the centre when user problems are too large or complex to be solved without the aid of technical specialists. Staff may also be asked to audit systems performance, establish back-up and recovery procedures, plan data access, assist with design of security, plan projects or document user requirements. This is an extension of the consultation services.

5. Product support

Software packages may reside at the information centre to provide end-users with the services such as graphics, spreadsheets, decision support, modelling capabilities, financial analysis, database management. Staff may demonstrate how the software is used and sometimes provide a sample problem solution walkthrough.

6. Hardware access

The centre controls the terminals, computers, printers and other equipment. The centre, in some organisations, acts as an in-house computer store. End users can try out the equipment, receive advice about the relative merits of various models from various manufacturers. The centre may provide training, configuration assistance and maintenance of the resources acquired from the centre.

7. Staffing

Some information centres provide back up assistance for end users who have a temporary need for information processing personnel.

8. Computer resource planning and justification

The centre can help end-users analyse their workloads, make projections of future needs and prepare (and justify) request for additional funding for computer resources. The centre nurtures end user awareness of the importance of standardisation and integration of resources.

9. New service evaluation

The centre staff assesses the user needs and when new products (hardware and software) come on the market, they help in evaluation as per the user needs and identify those that will be useful to enhance end user self-sufficiency and productivity. If necessary, the centre may then initiate a proposal to management for the acquisition of the product.

10. Administrative services

These services include promotion of the information centre activities, introduction of new users to the information centre, new product announcement, accounting and billing for centre use, equipment maintenance and service and keeping a library of computer-related material.

In its modern day applications, the information centre has become synonymous with the information technology department. In many instances it is more than a helpdesk.

QUESTION SEVEN

a)

i) Dynamic and static testing

Static testing involves evaluating a system or component based on its form, structure and content. No execution is conducted.

Dynamic testing is the testing performed by executing a program.

ii) Performance testing and usability testing

Performance testing is conducted to evaluate the compliance of a system or component with specified performance requirements.

Usability testing is conducted to evaluate how an operator interacts with the system.

iii) Regression testing

Regression testing involves re-testing software that has been modified to fix —bugs—. It also aims to ensure that no other previously working functions have failed due to the changes.

iv) User acceptance testing

User acceptance testing is carried out to determine whether or not a system meets previously defined acceptance criteria. The user department usually conducts it.

Objectives include:

- Finding software errors;
- Finding out user demands; and
- Evaluating operational procedures.

b) Computer Aided Software Testing help ease the burden of system testing

Potential uses include:

- Repeating test executions;
- Performance assessment;
- Simulating interfaces;
- Checking test results;
- Debugging; and
- Static and dynamic analysis.

Problems in using CAST include:

- Misunderstanding the test scope and the method;
- Poor selection and implementation of tools; and
- Poor quality CAST tools.

QUESTION EIGHT

a) Project

A project is a sequence of unique, complex and connected activities having one goal or purpose and that must be completed by a specific time within budget and according to specifications. A project is an undertaking with a defined start and end that is carried out to meet established goals within scheduled cost, time and quality objectives.

Project management co-ordinates the resources necessary to complete projects successfully. It is the combination of systems, techniques and people used to control and monitor project activities.

b) The role of the following in project management:

Project management is the process of defining, planning, monitoring and controlling the development of an acceptable system a minimum cost within a specified time frame.

A project manager is a senior analyst who uses planning, staffing, organising, scheduling, directing, and controlling skills to ensure the success of a project.

Project sponsor. Accountable for the resources invested in the project.

c) Challenges facing projects include:

- Team building;
- Expected and unexpected problems;
- Delayed benefits;
- Use of specialists; and
- Conflicts.

d) Phases of the project lifecycle

This refers to the major time periods through which a project passes. The major project phases are

- 1 Defining phase. Deciding whether the project should begin and committing to do so. The stages here are:
 - A. Initiation stage. Establishing terms of reference and appropriate management structure.
 - B. Formation stage. Selecting the project personnel.
 - C. Objective setting. Project objectives should be SMART.
- 2 Planning phase. Aims to devise a workable scheme to accomplish the overall project goal.
 - A. Task planning stage. Breakdown of the project into manageable tasks.
 - B. Feasibility and fact-finding stage. A feasibility study is a formal study to decide what kind of system should be developed to meet the needs of the organisation.
 - C. Position analysis, options generation and options evaluation. Use of SWOT analysis to determine the organisation's current position and available future options.
- 3 Implementing phase. Co-ordinating people and other resources to carry out the project plan.
 - A. Design and development stage. Specification and construction/sourcing of the actual system.

-
- B. Implementation stage. Installation or making the developed system available for use.
- 4 Controlling phase. Monitoring and measuring progress and taking corrective action to ensure project objectives are met.
- 5 Completing phase. Involves formalising acceptance of the project and bringing it to an orderly end. May entail;
- Checking that all products are complete and delivered.
 - Checking on the status of any outstanding requests for change.
 - Checking that all project issues have been cleared.
 - Approval of the project completion report.
 - Arranging for a post-implementation review.

e) The Internet

The Internet is a collection of linked network systems spanning the globe. Connection is facilitated via an Internet Service Provider (ISP). The user is registered as an Internet subscriber and pays a small monthly fee together with local telephone call charges.

What are some of the products of the NET?

- Email services- yahoo, hotmail
- Search engines
- File transfer (ftp)
- Newsgroups and chats
- World wide web (WWW)

SOLUTIONS FOR PAPER 2

QUESTION ONE

a) Structure and contents of an Invitation to Tender (ITT)

An **invitation to tender** sets out the specifications for the required system explaining how it is to be used and setting out a time scale for its implementation. It will set out the performance requirements for the new system. *Typical contents include:*

- Background information
- Volume of data to be processed
- Complexity of processing
- Number of offices to be connected
- Speed of processing required
- Inputs and outputs desired.
- File processing needed
- Estimated life of the system
- Upgrades anticipated
- Contacts with the company
- Form of submissions
- Closing dates
- Address for submission

Various sources of information on suppliers

- Retailers
- Computer manufacturers
- Industry trade journals
- Systems consultants
- Companies that perform software testing/evaluation
- Users of the package

b)

- i) Archiving is the process of moving data from primary storage such as a hard disk to portable media for long-term storage. It provides a legally acceptable business history while freeing up hard disk space.
- ii) Back-up means making as copy of data/system files in anticipation of future failure or corruption. A back-up copy of a file is a duplicate copy kept separate from the main system and only used if the original fails.

c) Audit trail

An **AUDIT TRAIL** is a record of file updating that takes place during a specific transaction. It enables a trace to be kept of all operations on files. Outputs can be traced back to their inputs. Computer audits occur through the computer or around the computer.

d)

- i) **The 1998 Data Protection Act gives individuals seven specific rights in respect of personal data held about them by others.**

These are:

- 1 **Right of subject access:** Upon making a written request and paying areasonable fee (currently £10) individuals are entitled to be told whether the data controller, or someone on their behalf, holds personal data about them and if so to be given:
 - A description of the personal data;
 - The purposes for which they are being processed; and

- Those to whom they may be disclosed.
- a) **Right to prevent processing likely to cause damage or distress:** An individual can, by written notice, request that a data controller does not process data that might cause substantial damage or distress.
- b) **Right to prevent processing for the purposes of direct marketing:** An individual can, by written notice, require a data controller to cease processing data for the purposes of direct marketing.
- c) **Rights in relation to automated decision-making:** An individual can, by written notice, require a data controller to ensure that no decision is made about them by purely automated means. Where a decision has been made affecting an individual by solely automated means, the data controller must inform the individual of the decision.
- d) **Right to take action for compensation for damages caused by the data controller:** Where an individual has suffered damage and/or distress because of a data controller's contravention of the Act, damages can be claimed.
- e) **Right to take action to rectify, block, erase or destroy personal data:** A data subject may apply to a court requesting that any inaccurate data relating to them, including any expressions of opinion based upon inaccurate data, be rectified, blocked, erased or destroyed.

Right to request that the Commissioner assesses whether any contravention of the Act has occurred: Any person may ask the commissioner to assess whether or not it is likely that any processing of personal data is being, or has been, carried out in accordance with the Act.

- ii) **To ensure compliance with Data Protection Act** a company should appoint someone responsible to carry out the duties of Data Protection Officer. These duties must include:
- a) Performing a regular check that the company's entry in the Register of Data Controllers is up to date;
 - b) Ensuring that any processing carried out is in accordance with the purpose(s) stated in the register;
 - c) Ensuring that there are adequate controls in place such that communication from data subjects is promptly dealt with in accordance with their rights;
 - d) Maintaining a system of controls ensuring compliance with the eight data protection principles.

QUESTION TWO

a) Contents of a PID include:

- The business objectives.
- The project objectives.
- The scope of the project.
- Constraints.
- The ultimate customer of the project.
- Resources that will be used.
- Risk analysis.
- Preliminary project plan.
- Purchasing and procurement policy.

b) Duties and responsibilities of the project manager

The project manager is the person who takes the ultimate responsibility for ensuring the desired result is achieved on time and within budget.

Duties include:

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Outline planning. Setting project targets, determining activities and their sequencing.

- Detail planning. Breaking down the project into activities and tasks, determining resource requirements and network planning.
- Teambuilding. Motivation and leadership.
- Communication. Both within the project team and with senior management.
- Co-ordination. Between team members, users and third parties.
- Monitoring and control. Through feedback and corrective action.
- Problem resolution. For any unexpected problems.
- Quality control. Trade-off between timely completion and project quality.

Responsibilities to management include:

- Efficient use of resources.
- Keeping management informed.
- Ethical behaviour.
- Maintaining customer orientation.

Responsibilities to the project and the project team are:

- Keeping the project on target.
- Ensuring availability of required resources.
- Integrating new team members.
- Provision of the necessary support if members leave.

c) Multimedia technology definition

Multimedia refers to the delivery of text, sound and pictures through a single terminal, using communications and computer technology

Multimedia applications include:

- a. Provision of training by use of interactive training materials and film demonstrations.
- b. Provision of computerised brochures and reports that could include audio and video clips.
- c. Enabling workgroup collaboration with users viewing each other on screen.

QUESTION THREE

a) Projects can become unsuccessful due to:

- Inadequate resources
- Taking shortcuts
- Expectations mismanagement
- Missed schedules
- Poor estimating techniques
- Lack of or unreasonably precise targets
- Budget overruns
- Lack of management and leadership
- Conflicting requirements

b) Changes to the original project plan could result from:

- New technology.
- Changes in personnel.
- Changes in user requirements.
- Changes in business requirements.
- New legislation.

c) Role of the accountant in IS management, delivery and quality assurance

- Investment appraisals;
 - Cost-benefit analysis;
-

- Internal audits;
- Performance measurements;
- Presenting user concerns; and
- Assessing usability.

d) CASE tools in the systems development process Advantages

- Automate manual tasks
- Encourage standard methods
- Improve accuracy and overall quality of end product

Disadvantages

- Cost of CASE software and hardware needed
- Lack of CASE standards
- Other issues
- CASE does not replace need for analyst's skills
- Initial preparation effort not always worthwhile

QUESTION FOUR

b) Main participants in the systems development

- Users
- Management
- System analysts
- System programmers
- Application programmers
- External vendors / service providers

c) Fact-finding techniques

- Interviewing
- Documentation review
- Observation
- Questionnaires

d) Research

- Journals, periodicals, books
- Internet sites
- Hardware and software vendors
- Independent firms that provide information
- Newsgroups
- Professional meetings, seminars, discussions
- Site visits to observe a system in use

e) Post-implementation evaluation performance

These establish whether the objectives and targeted performance criteria have been met, and if not, why not, and what should be done about it. Comparisons are made between actual and predicted performance in terms of:

- Throughput speeds
- Use of computer storage
- Numbers and types of errors/queries
- Costs of processing

The post implementation reviews should be conducted some time after the system implementation to take consideration of initial teething problems.

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Post-implementation evaluation feedback

Includes various areas:

- Accuracy, completeness, and timeliness of output
- User satisfaction
- System reliability and maintainability
- Adequacy of system controls and security
- Hardware efficiency/platform performance
- Effectiveness of database implementation
- Performance of the IS team
- Completeness and quality of documentation
- Quality and effectiveness of training
- Accuracy of cost-benefit estimates and development schedules

A post-implementation evaluation is based on fact-finding methods similar to techniques used during the systems analysis phase

QUESTION FIVE

a) Tools

DFDs

Data flow diagrams (DFDs) are graphical aids that describe an information system. DFDs represent a logical model that shows **what** a system does, not **how** it does it.

Four basic symbols

- Process
- Data flow
- Data store
- External entity

Context diagrams/ Diagram 0

Lower-level diagrams- Level 1-3

Structured English

Subset of Standard English

- Describes process logic
- Use only standard sequence, selection, and iteration structures
- Use indentation for readability
- Use a limited vocabulary

Decision tables

- Show a logical structure that describes process logic
- Every logical combination is shown initially
- Results then can be combined and simplified
- Programmers can use decision tables in developing code

Decision trees

- Graphical representation that shows a decision table's conditions, actions, and rules
- Logic structure is shown horizontally
- Easy to construct and understand
- Decision table is better in complex situations

b) Data Dictionary

Documents specific facts about the system. What?

- Data flows
- Data stores

- External entities
 - Processes
 - Records (data structures)
 - Data elements (data items, fields)

Why?

- Elements of the system will be described precisely enough to be translated into code
- Allows critical information to be communicated between users and system developers
- Enhances efficiency by avoiding confusion over names and formats
- Must document specific data-related facts, data flows, processes, data stores, external entities, data elements, records, and data dictionary reports
- Standard form or CASE tool can be used

c) Entity relationship model

Any representative graphical model is acceptable as an answer to this part of the question. This sample answer concerns the entity-relationship model.

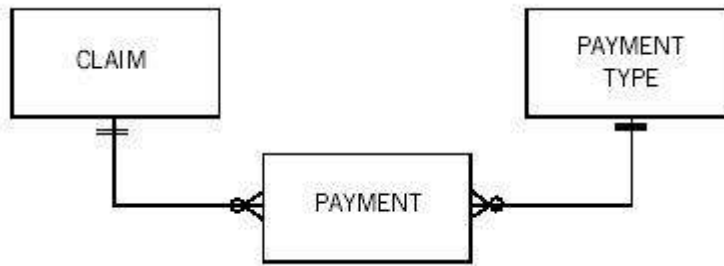
- i) The entity-relationship model describes the main **—things— of interest to the business** and defines the relationships between them. It provides a graphical representation of some of the business rules of the system and these need to be confirmed by the user. For example, an entity type **CLAIM** may be in a one-to-many relationship with another entity type **PAYMENT**. This will have to be confirmed with a representative business user ñ can they confirm that an individual payment is never for more than one claim? The entity-relationship model also forms a basis for subsequent file and database design.

In an entity-relationship model, rectangular boxes show the main entity types (entities) of the system. Entities are defined as singular nouns that describe important business objects, events or concepts. The lines between the entities define relationships. These are usually one-to-one , one-to-many, or many-to-many. The many end of a relationship is shown as a **—crow's foot**.

The relationship is made more precise if the minimum and maximum values are specified on the relationship, as shown in the following example, using the Martin/Odell notation.

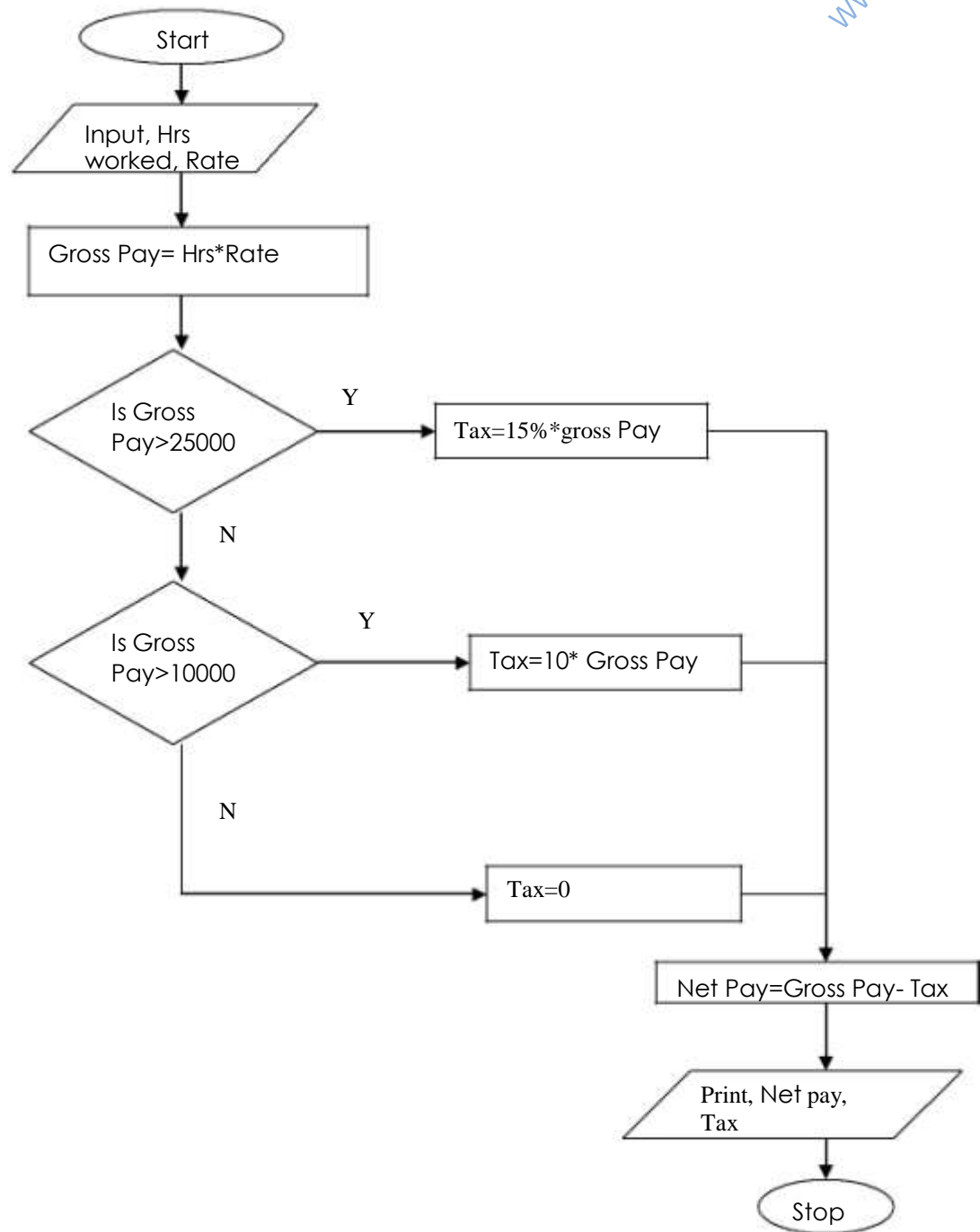
For example, in the relationship between **PAYMENT** and **CLAIM**, a **CLAIM** may be associated with a minimum of zero payments (because the CLAIM is rejected) and a maximum of many. A **PAYMENT** is for a minimum of one CLAIM and also a maximum of one **CLAIM**.

- ii) The model is an improvement on textual specification in at least two ways. Firstly, it is a more compact way of showing the business rules and specifying these in consistent detail. Secondly, it also identifies what business relationships are not supported. For example, in the above entity-relationship model there is no direct link (or relationship) between CLAIM and PAYMENT TYPE. This means there is no direct business relationship between a particular CLAIM and the way it is settled. It is very unlikely that this unsupported business rule would be explicitly stated in a



textual specification.

d) Flow chart- Kazi Ltd



QUESTION SIX
a) Guidelines

- i) Restrict user access to screen locations where data is entered
- ii) Provide a descriptive caption for each field and show the user where to enter the data
- iii) Do not require users to type leading zeroes or trailing spaces for alphanumeric fields
- iv) Display default values that users can accept and use default values for constant data
- v) Display a list of acceptable values for fields with a limited number of valid choices
- vi) Provide a way to leave the data entry screen without inputting the current record
- vii) Provide an opportunity to confirm the accuracy of input data before entering it
- viii) Provide a means to move among form fields in a standard, or in another, order
- ix) Design the screen form to match the layout of the source document
- x) Allow the operator to add, change, delete, and view records
- xi) Design a method to allow operators to search for a specific record

b) Common ways in which users interact with and control computer systems

Users can control system actions with interactive menus and prompts:

• Menu screens

Menus display a list of user-selectable options

Menu-driven system uses a hierarchy of main menus and submenus

• Shortcut key combinations can be used in a menu design

• Hot buttons

• Prompt screens

User types a response to a prompt

Responses can include commands

• Structured Query Language (SQL) can be used •

Question/answer screens can be used

• Natural language techniques can be used, similar to Internet search engines

• Graphical user interfaces

A GUI environment includes process control and data control, and are easy to use

Common features

- Menu bar
- Toolbar
- Drop-down menus
- Dialog, text, and drop-down list boxes
- Option (radio) buttons, toggle switches, and spin bars

c) Batch and online data capture

Batch input method

- Data entry is done over period of time
- Collection (batch) of data is input at one time

Online data entry method

- Also called direct data entry
- Data is validated and available immediately

Source data automation

- Combines online data entry with online data capture
- Uses magnetic data strips and swipe scanners
- Common examples: ATMS, point-of-sale terminals, bar code readers, patient ID bracelets, libraries

d) Computer Aided Software Engineering (CASE) tools

CASE is the use of automated tools to aid in the software development process.

- CASE tools increase productivity
 - Full set of CASE tools is called a toolkit
 - CASE tools can handle variety of tasks
 - Create and integrate data flow diagrams
 - Logical and physical design
 - Generation of program code

Features and functions of CASE tools

- 1 Upper CASE. Describe and document business and application requirements.
- 2 Middle CASE. Develop detailed designs.
- 3 Lower CASE. Deal with the generation of program code and database definitions.

QUESTION SEVEN

a) Advantages of the software package approach

1. Cost savings

The purchase of a software package is perceived as significantly cheaper than developing a bespoke alternative. In a bespoke system the cost of systems development is borne completely by the organisation commissioning the system. In a software package solution, the cost of the systems development is spread across all the potential purchasers of the system hence the reduced cost of purchase.

2. Time savings

The bespoke systems development needs to be tightly specified, designed, programmed and tested. This part of the lifecycle is very time-consuming and during this period requirements may change, so complicating the process even further. The software package is a product that already exists. It can be purchased and implemented almost immediately. There is no requirement for design, programming, unit and systems testing.

3. Quality benefits

The software package is a proven product that has undergone systems testing (in development) and user acceptance testing (by the users who have already bought and used the package). Hence the product should be relatively error-free, as well as fulfilling most of the functional requirements of the application.

4. Available documentation and training

In the software package approach the documentation can be inspected and evaluated before purchasing the product. The documents (such as user manuals and HELP systems) are usually of high quality because they represent an important part of the selling process. In contrast, the documentation supporting a bespoke systems development is not available until very late in the lifecycle and is often sub-contracted to users who do not have the time to do the job properly.

Training: Prospective purchasers can attend a course prior to buying the product and so further evaluate the suitability of the package. Similarly, economies of scale allow the software vendors to produce and provide high quality training courses, supported by professional trainers, at a relatively cheap price.

5. Organised maintenance and enhancement

Software products are usually supported by a formal maintenance agreement. Although this agreement costs money, it usually provides:

- Unlimited access to a help desk, where experts can sort out user problems;
- Upgrades to the software that correct known faults and also include new functionality defined and agreed with the user community.

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The cost of this support and enhancement is again spread across a number of users and so can be offered relatively cheaply to each individual customer.

6. Try before you buy

This entails the ability to examine the product in detail before purchasing it. This is clearly not possible in the bespoke approach to systems development where the product is not ready until the end of the project. The evaluation of the package can be assisted if it can be borrowed (or rented) for a trial period and used in the target hardware and software environment. This can be supplemented by visits to actual users (reference sites) where the operation of the package can be observed and user comments and experiences documented.

Disadvantages of the software package approach.

1. Ownership

In the bespoke systems development approach, the ownership of the software usually resides with the purchaser – the customer, not the supplier. This is particularly clear if the development is undertaken in-house, because the ownership of the code clearly resides with the organisation, not the IT department or individual programmers. Even if an external software house produces the code, the contract usually specifies that the source code belongs to the commissioning agent (the customer) and not the supplier.

In the software package approach, the ownership of the software usually remains with the supplier. Customers are licensed to use the product, but they never own it. The software purchaser has little control over the future direction and ownership of the product they are buying. This is not the case with a bespoke development.

2. Financial stability of the supplier

External software suppliers are subject to the vagaries of management and the markets. There is a risk that they may go out of business, or experience financial problems that affect the quality of their support and development services.

3. Competitive edge

Many organisations claim that they use (or wish to use) IT and IS as a competitive edge in the market place. They develop bespoke systems to give them that edge. In the software package approach, the software solution (or product) is open to all competitors and potential competitors. It is difficult to see how such a solution can provide a competitive edge, as all potential competitors have access to that solution.

4. Failure to fit requirements

This is the inability of the product to fit all (100%) of users' requirements. This means that either:

- Users have to make compromises and accept that they will not get all the functionality they require; or
- Tailored amendments will have to be made to the software product to deliver the required functionality.

Whichever way is chosen, it is clear that most software packages do not fulfil all the user requirements defined for a particular application.

5. Legal redress

In a bespoke development, the ultimate failure of the system to fulfil the user's functional requirements can be resolved (usually in the favour of the customer) by law. Clearly this last resort is inappropriate if the system has been developed by an internal IS department, but it is an option if the system has been developed by an external software house.

b) Reasons for buying a software package

- Lower costs
- Requires less time to implement
- Proven reliability and performance benchmarks
- Implemented by other companies
- Requires less technical development staff
- Future upgrades provided by the vendor

c) Relevance of prototyping to systems development

A prototype is an early, rapidly constructed working version of the system. The working model helps users understand the system that is being developed.

- Prototyping produces a less-expensive model
- Can eliminate problems before the final version
- Goal is to develop a working model quickly
- Early way to test essential system features
- Prototype can be upgraded or replaced during later SDLC phases

QUESTION EIGHT**a) MIS Projects****i) Factors to consider when building a project team**

Factors to consider when constituting a project team are:

- Skills required
- Availability of staff
- Costing considerations
- Amount of work to be done
- Levels of supervision required

To enhance performance of the project team, ensure:

- Effective communication
- Awareness of team members and results orientation
- Collaboration and creativity
- Trust and a supporting atmosphere
- Commitment
- Conflict resolution (Consider positive and negative conflicts)
- Acceptance of change

ii) Methods of monitoring and reporting progress

- Project budget. The amount and distribution of resources to a project. Budgeting may be top down or bottom up.
- Gantt charts.
- Network diagrams.
- Project Evaluation and Review Technique. Incorporates uncertainty in determining project duration by probabilistic consideration of task duration and computation of expected duration.
- Resource histograms. These are bar charts showing estimated resource requirements against available resources for the project duration.
- Progress reports and milestones. A progress report shows the current status of the project in relation to the planned status. A milestone is a significant event in the project, usually completion of a major deliverable.

b)**i) Classification of systems****i. Closed and open systems**

Systems may be classified as *open*, *relatively closed* or *closed*. A closed system doesn't exchange resources with its environment. This implies that the system has no

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input and no output relating it to the environment. E.g. A battery run and time control system of light signals placed temporarily on the road during repairs.

Open systems exchange resources with their environment via input and output, some of which are ill-defined or even unknown. An organisation is an open system. By injecting negative entropy into its operations (i.e. by maintaining its order) an open system is able to adapt continually to its environment.

Between the two-extremes of closed and open systems is *relatively closed system*. These system exchange resources with their environment only through well defined input and output. Their input and output are defined when the system is designed, and the input are controlled to conform to these predefined form.

ii. Deterministic and probabilistic systems

The operation of a deterministic system is completely predictable e.g a computer program. The present state and the inputs of such a system fully determine its operations and its next state e.g. a microprocessor chip or a correct software package.

The outputs of probabilistic (or stochastic) systems can be predicted only in terms of the probability distribution of these values or of some aggregate measure such as the value. There is always uncertainty as to their actual value at any given time. Both organisations and ISs are probabilistic.

ii) Systems Theory

The systems approach or systems theory is an approach (abstract system of ideas) to problem solving - the problem being how to structure an organisation or analyse an IS - in which the entity being studied (an organisation or IS) is considered a system.

Features of the Systems Theory

The fundamental consideration affecting the design of information systems stem from Systems Approach. The approach has many facets but the following are the most salient:

1. All systems are composed of inter-related parts or sub-systems and the system can only be explained as a whole. This is known as *holism* or *synergy*. The systems view is that the whole is more than just some of the parts and those vital interrelationships will be ignored and misunderstood if the separate parts are studied in isolation.
2. Systems are hierarchical, that is, the parts and sub-systems are made up of other smaller parts. For example, a payroll system is a subsystem of the Accounting System, which is a sub of the whole organisation. One system is a sub of another...
3. The parts of a system constitute an indissoluble whole so that no part can be altered without affecting other parts. Many organisational problems arise once this principle is flouted or ignored. Changes to one department could create untold adverse effects on others - ripple effects: e.g. changing a procedure in one department could affect others e.g. changing a procedure in admissions department of a college will affect the academic departments- type of data captured, process
4. The sub-systems should work towards the goals of their higher systems and should not pursue their own objectives independently. When subsystems pursue their own objectives, a condition of *sub-optimality* arises, and with this the falling of the organisation is close at hand! Information systems designers should seek to avoid the sub-optimality problem!

-
5. Organisational systems contain both hard and soft properties. Hard properties are those that can be assessed in some objective way e.g. the amount of PAYE tax with tax code, size of product- quantifiable. Soft properties - constitute individual taste. They cannot be assessed by any objective standard or measuring process e.g. appearance of a product, suitability of a person for job and any problem containing a *political* element.

SOLUTIONS FOR PAPER 3

QUESTION ONE

a) **A software license typically covers:**

- Number of authorised users;
- Modifications allowable without manufacturer consent;
- Circumstances for termination; and
- The limitation of liability.

So as not to infringe copyright, organisations should:

- Make sure they receive and keep licenses;
- Track the number of users accessing licensed programs;
- Periodically check computers for unlicensed software;
- Buy from reputable dealers;
- Require itemised invoices giving details of hardware and software supplied.

b) **Risk management entails:**

- Risk assessment. This involves identification of risks, quantification of risks and placing of risks in order of potential loss.
- Risk minimisation. This involves identification, costing, selection and implementation of counter-measures together with contingency planning.
- Risk transfer (insurance). The risks that cannot be covered by security measures should be insured against.

c) **The special characteristics of computer systems that cause extra problems for control over systems include:**

- Large volumes of data are concentrated in files that are physically small.
- Enormous quantities of data are processed without human intervention.
- It is easy to lose data on file.
- Unauthorised people can gain access to data on file.
- Information on a computer file can be changed without leaving a physical trace.

QUESTION TWO

a) **Contingency planning**

A contingency is an unscheduled interruption of computing services that requires measures outside the day to day routine operating procedures. A contingency plan must provide for standby procedures to continue operations, recovery procedures to correct the breakdown and personnel management policies for the procedures.

Contents of a contingency plan include:

- Definition of responsibilities.
- Setting priorities.
- Back-up and standby arrangements.
- Communication with staff.
- Public relations.
- Risk assessment.

b) **The two forms of control**

Physical access control

This ensures intruders do not get near computer equipment or storage media.

Methods of controlling human access include:

- Personnel (security guards)
 - Mechanical devices (lock and keys)
-

Electronic identification (card swipe systems, keypad systems)

Logical access systems

These are controls designed to prevent those who have access to a terminal or computer from gaining access to data or software. A logical access system performs three operations when access is requested:

- Identification of the user.
- Authentication of the user identity.
- Check on user authority.

Logical access is accomplished through:

- Password systems
- Encryption
- Biometrics

Password systems

A password is a set of characters, which may be allocated to a user, terminal or facility which are required to be keyed into the system before further access is permitted. Passwords should be kept secret, changed regularly and should not be obvious.

Encryption

Data transmitted over telecommunication links or networks suffers three security dangers:

- Hardware faults.
- Unauthorised access by eavesdroppers.
- Direct intervention by an impostor who sends false messages down the line.

Encryption involves scrambling the data at one end of the line, transmitting the scrambled data and unscrambling (decrypting) it at the receiving end of the line.

Authentication involves making sure that the message has come from an authorised user by the addition of an extra identification field to the message.

Biometrics- use of human biological features e.g retina, sound, to identify or authenticate individuals accessing the system.

c) Hackers and Viruses

A hacker is a person who attempts to invade the privacy of a system. A virus is a piece of software that invades programs or data, and which replicates itself and causes harm to data or the IS.

Viruses are written by programmers and are usually placed in:

- Free software.
- Pirated software.
- Games software.

Examples of viruses are:

- **TROJANS.** This is a program that while visibly carrying out one function, secretly carries out another.
- **WORM.** This is a program that replicates itself inside a computer system.
- **TRAP DOORS.** These are undocumented entry points into the system to which malicious code can be attached.
- **LOGIC BOMBS.** These are pieces of code triggered by a certain event.
- **TIME BOMBS.** These are pieces of code triggered by a certain date.

Protection against viruses includes:

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- Vaccine programs.
- Guarding against introduction of unauthorised software.
- Cleaning of disks before downloading.

QUESTION THREE

a) **The characteristics a quality software product include:**

- Reliability;
- Usability;
- Security;
- Portability;
- Shareability; and
- Interoperability.

b) **Quality management, quality assurance and quality control**

Quality management is concerned with controlling activities so as to ensure that products or services are fit for their purposes and meet specifications.

Quality assurance focuses on the way a system is produced. Procedures and standards for development are of key concern.

Quality control is concerned with checking and review work done.

Quality management involves:

- Planning. Standards and procedures formulated;
- Devising suitable instruments and techniques to monitor actual quality;
- Comparison of actual and planned quality;
- Control action for any variances; and
- Review of plans and standards for continuous improvement.

c) **Costs and benefits of new systems**

Costs of a new system

- Equipment costs.
- Installation costs. Room set-up
- Development costs- Consultancy fee, changeover.
- Personnel costs. Training, recruitment, redundancy.
- Operating costs. Maintenance, accommodation, power, insurance etc

Benefits from the new system include:

- Savings from ceasing operations of the old system.
- Savings from using the new system.
- One-off revenue benefits.
- Intangible benefits like better customer satisfaction or improved staff morale.

QUESTION FOUR

a)

i) **Entity-relationship diagrams (ERDs)**

- An ERD is a graphical model that shows relationships among system entities
- Each entity is a rectangle, labelled with a noun
- Each relationship is a diamond, labelled with a verb

Types of relationships

- One-to-one (1:1)
- One-to-many (1:M)
- Many-to-many (M:N)

A full ERD shows all system relationships

ii) Entity Life Histories

Each entity identified on the ERM contains a specific set of attributes. During the existence of each entity-occurrence these attributes are given a value that may be updated many times until eventually the whole entity-occurrence is deemed not to be of any more interest to the system and is ‘killed off’ or archived. Thus, each entity-occurrence has a life of its own that follows a set pattern common to every occurrence of the entity it belongs to and which has to be ‘discovered’ by the analysts. The Entity Life History (ELH) is a diagram where the possible life of each occurrence within an entity, from its creation to its deletion, is recorded.

b) Desirable characteristics of a user-friendly system

- Ease of data entry;
- Intuitiveness;
- Consistent design;
- On-screen help;
- On-screen prompts and dialog boxes;
- Ability to back-track; and
- Convenience.

c) Common computer outputs include printed reports and on screen reports. Explain the main classifications of reports.

Reports can be classified by content

- Detail reports
- Exception reports
- Summary reports

Detail reports

- Provide the most information
- At least one line of output is produced for each record processed
- Detail reports can be quite lengthy

Exception reports

- Show only records that meet a specific condition
- Useful when particular information is required
- Special parameter queries can be used to select only the records that meet specified conditions

Summary reports

- Show only subtotals and totals
- Useful for upper-level managers who do not require extensive detail

Reports also can be classified by distribution

- Internal reports
- External reports

Internal reports

- Distributed within the organisation
- Usually printed on stock paper
- Blank, single ply, standard size
- Less expensive
- Can be used for many types of reports

External reports

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- Distributed outside the organisation
 - Might include statements, invoices, or pay cheques
 - Usually printed on special forms
 - More expensive than stock paper
 - Paper must be changed for each report printing job
 - Multi-part forms must be separated or decollated
 - Special forms can use pre-printed graphics and logos
 - Special applications, such as checks, require special forms

Factors to consider:

- Types of printers
- Print volume calculations
- Print-time calculations

QUESTION FIVE

a) **The stages of implementation are:**

- Hardware and software acquisition
- Staff Training,
- Installation,
- File Conversion
- Testing
- Changeover

Hardware and software acquisition

This involves buying required hardware and software. Need ITT

Staff training

Aimed at maximising staff utilisation of the system. If you want to maximise your investment in new systems you will need to invest in staff training to ensure staff can maximise their utilisation of that system.

There are a number of keys to good training.

- 1 Plan the training to be as close as possible to live usage so that members of staff do not get the chance to forget what they have learned.
- 2 Get the design team to produce user documentation for the training course. User manuals are necessary.
- 3 Who are you going to get to do the training for you? If the systems are supplied externally then the software house will be best, though for common 'off-the-shelf' packages there will be a number of cheaper computer training specialists.

Installation

At this stage the new system will be physically installed into the firm's premises. This requires careful management:

- It will need to be addressed early in the systems development work as it may have a long lead-time. For instance it may be necessary to obtain planning permission for any building alterations;
- It is very easy to overlook simple things like ensuring you have sufficient power points, desk space, filing cabinets and so on;
- It requires close consultation with all of the interested parties i.e. hardware and software suppliers, communication services providers, builders, users and so on.

File conversion

Now that the new system is physically located on the premises the next stage is to load the correct standing data and opening balances onto the new system.

Testing

This will take two forms:

- 1 *Test data* posted to the new system prior to live use to check it will process accurately. A (now poverty stricken) MP said recently — Asking Lloyds to self regulate Lloyds is like asking the Mafia to self regulate the Mafia. When designing the test data take care that the programmers are not designing it — it is their work you are testing. The users or, if available, Internal Audit are best.
 - Periods of *acceptance testing* where there will be careful testing of live transactions in the early periods of use. The principle of acceptance testing is that the system is only completed when the users accept it is functioning properly.

Changeover

The four changeover options are direct, pilot, phased and parallel running:

Direct changeover .

The immediate replacement of the old system by the new. Often this is your only choice — there may not be office space to run both systems or you may be using new software on your existing hard-ware. It is to be positively recommended where the new system is based on an established off-the-shelf solution. As long as staff has been trained and the system has been tested it should work well.

Pilot changeover.

A distinct part of the new system is brought into use and, once tested, will be brought into use immediately elsewhere. This is particularly useful in distributed systems where you can pilot the new system in, say, the Leeds office and once it is working bring it into use in all other offices with immediate effect. Another type of pilot is known as

'Restricted Data Running' where, say, customers A-D are processed on the new system and once functioning properly all customers will be processed on it. In effect with pilot implementation you are selecting a *typical* part of the organisation and testing the new system within it using live, rather than test, data.

Phased changeover.

This is another popular option but it is more time-consuming than both direct and pilot. Here you will gradually introduce distinct parts of the new system. You can use either local offices in a wide area network — say, Nairobi in August, Mombasa in September, Eldoret in October and so on, or distinct software modules — say, payroll in August, stock control in September, word-processing in October. One advantage of phased implementation is cash-flow — you can spread the cost out over the phases, however it will cause disruption within the business as different parts of it are using different, often incompatible, systems.

Parallel running.

This is often assumed to be the best option. Certainly error detection is excellent as there is direct comparison of information between the old and new systems. It is however very costly and if your staff don't complain about being overworked during a parallel run then you are over staffed! It should be used only for 'business critical' systems where the cost of failure would be high.

b) 4GLs

These are non-procedural languages used in the quick development of software applications.

Features and functions that a Fourth Generation Language may provide:

- Query and report generators.
- Application generators.

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c) Business strategy for IT

A business strategy is an action plan detailing the long-term plans and direction for an organisation. Based on the organisation's mission statement, a series of long-term objectives are developed to ensure the organisation can meet its mission (reason for being).

Why is it important for organisations to have an IT strategy?

- To ensure a firm foundation on which to build future developments;
- To ensure the organisation is led by its requirements, rather than the technology;
- To ensure technology assumes its proper place as a tool;
- To clarify what IT will contribute to the organisation;
- To ensure that the company invests in appropriate solutions and are clear about the costs and benefits;
- To ensure the full benefits of any investment are realised;
- To avoid unexpected expenditure and the diversion of energy and resources;
- To avoid changing working practices just to suit the technology;
- To avoid inefficient and overly complex procedures;
- To ensure a smooth transition from one system to another;
- To ensure clear procedures for the monitoring, evaluation, review and revision; and
- To minimise problems, ensure appropriate fault tolerance, fault recovery procedures and contingency planning.

QUESTION SIX

a) Project management software

i) Features and functions of project management software

PM software e.g. Microsoft Project may be used for:

- Planning. Network diagrams and Gantt charts
- Estimating. Trend analysis, statistical estimations etc.
- Monitoring. Comparison of actual against budgeted performance and plan updates.
- Reporting. Standard and customised progress reports.

ii) Typically 4 inputs are required for PM software:

- Length of time required for each activity
- Logical relationships between activities
- Available resources
- When resources are available

iii) Merits and demerits of using PM software package in the project management process

Advantages:

- Quick re-planning
- Document quality
- Constant progress tracking
- What if analysis

Disadvantages

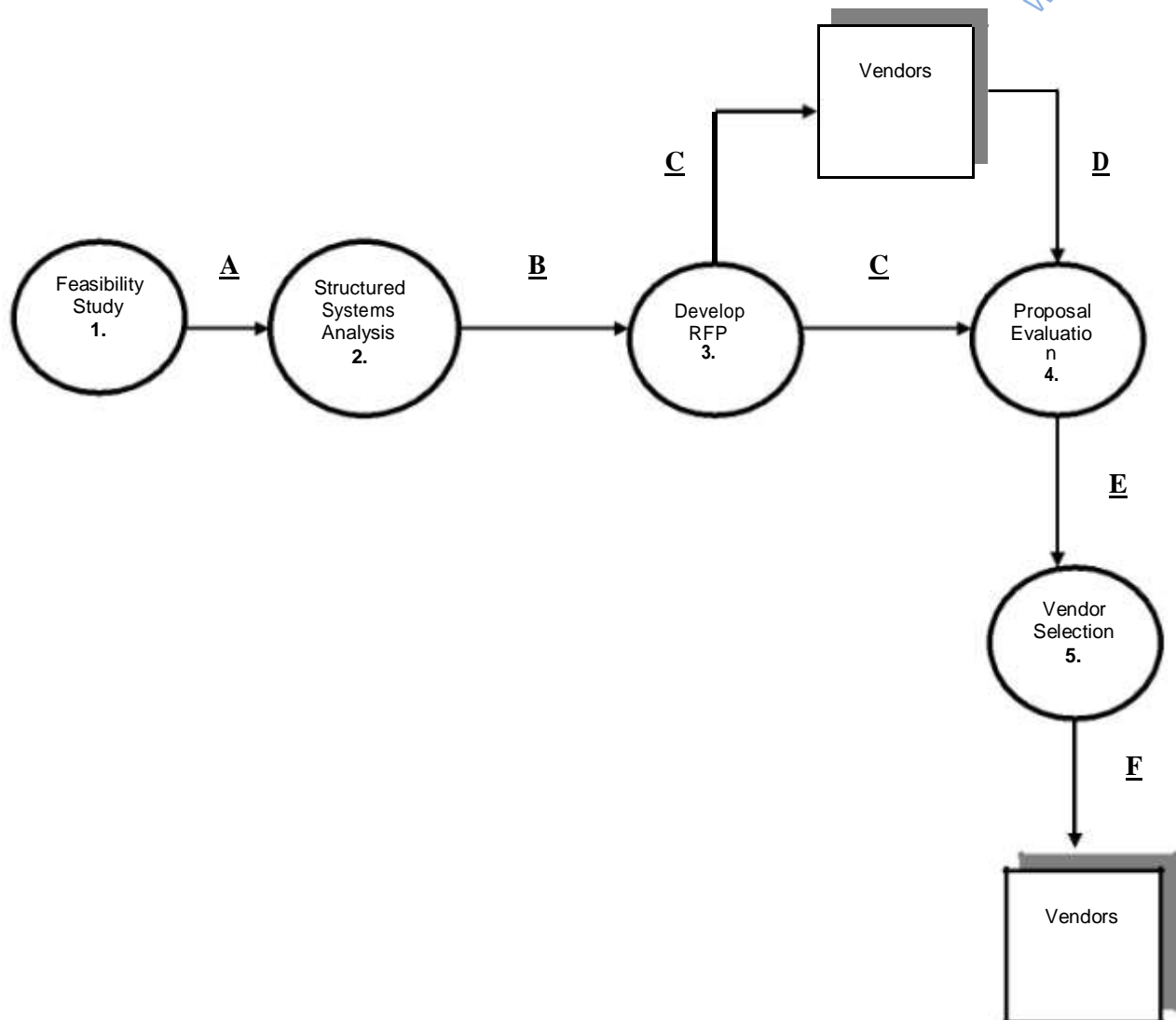
- Difficulty in use
- Loss of project focus/time

b) Key steps in the systems acquisition process

- Identify the key features of the system
- Estimate volume and future growth

- - Specify any hardware constraints
 - Prepare an ITT/ a request for proposal or quotation
 - Contact potential vendors
 - Assess vendor responses
 - Choose vendor (s)
 - Contract signing (service level agreement)

Steps in Evaluation and Purchase of Computer Hardware and Software



A- Feasibility Document

B- Hardware and software Requirement

C- Request for Proposal

D- Proposals

E- Accepted proposals

F- Purchase Order

(Source: Hicks, James Information Systems for Managers pg 497)

QUESTION SEVEN

a) Software testing

i) The scope of the software test depends on:

- Criticality of the system-- if very critical would require thorough tests
- Complexity (scope)- more complex more tests
- Size of system- number of modules will dictate the duration and type of tests
- Whether the system is stand alone or interfacing with other systems

ii) People involved in system testing

- Systems analyst

- Project manager
- User representative
- Programmer
- Operations manager/ management representative
- Auditors

iii) Limitations of software testing

- Test data may not test all the possible types or values of data input that may occur within a system
- There may be a problem of ensuring that all error messages contain adequate explanation to the errors that occur. Many error messages are quite understandable to the program writer but not necessarily to the program user- **e.g. error 43201 ... may not be discernible for the user**
- The test plan may not cover all the functionality of the system especially if it is large and complex
- Testing process may be inadequately documented- due to human error or lack of complete documentation
- Inappropriate focus to the testing
- The software may be tested to check what it should do rather than what it should not do
- No good past experience for software testing (no rule of thumb)
- Software is logical not physical thus it requires rational thinking
- system testing can be complex and costly

b) DSS

Characteristics of DSS:

The DSS support managers in their work decision making. They overlay both data processing systems and office support systems and acquire their basic data from routine transaction processing

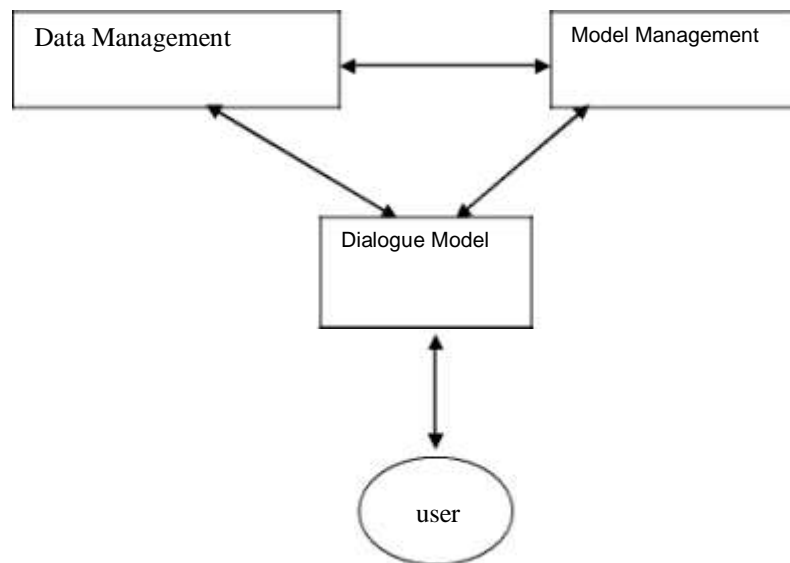
DSS have the following characteristics:

- i) DSS are developed with the participation of and often, by individual managers or a group of managers to support a range of decisions of concern to them.
- ii) DSS directly support the decision making process. DSS are able to support unstructured problems where the manager interacting with the system supplies semi- structured decisions in which some of the dependencies between factors and their consequences are expressed by models and some parts. Best suited for semi-structured problems where parts of the analysis can **be computerised while still the decision maker's judgements and insight is** needed to control the process. Tailoring to their needs.
- iii) Provide analytical capabilities expressed in DSS models and this is the reason for the existence of these systems. This entails projecting possible future during a planning process. 2 principle modes of analysis are available. The **—what if II mode, where the users consider alternative scenarios and their results and the goal seeking mode, the user asks, —what would it take- in terms of input, factors to achieve a particular performance?II**
- iv) In DSS, graphics are usually available to portray a decision situation made with a lot of scrutiny then it can be done with a tabular display of data.- graphical presentations
- v) They combine internal and external information in supporting d-m.
- vi) The computer provides support but does not replace the decision makers **(manager's) judgement. It doesn't provide pre-determined solutions.**
- vii) Common where effective problem solving is enhanced by interaction between the computer and the manger.

TECHNOLOGY

viii) Helpful to top level managers who have little time for detail - summaries.

Components of DSS:



1. The data management subsystem/ Database:

The data management subsystem of a DSS relies on a variety of internal and external databases. The power of DSS derives from their ability to provide easy access to data.

2. Model Management Subsystem/ Models:

The power of DSS pressed on the user ability to apply quantitative, mathematical models to data. Models have different areas of application and come from a variety of sources.

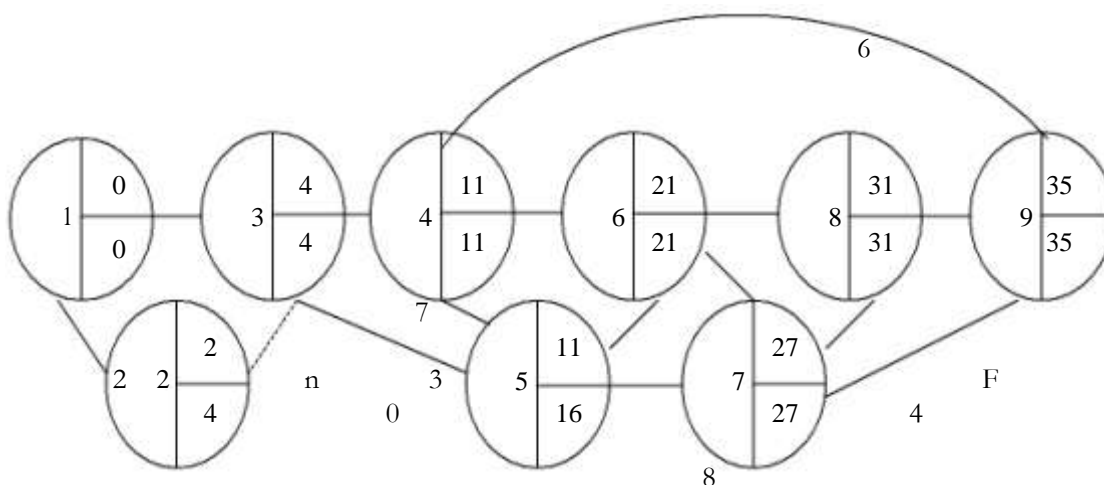
3. Dialogue Management Subsystem/ User Interface:

Along with DSS's ability to apply models to large volumes of data from a variety of sources, a single advantage of DSS is the user friendly and flexible interface between the decision-maker and such a system.

QUESTION

EIGHT a)

- i) Critical path = MDKLFG
Duration = 35 days



ii) Total cost

Cost of normal activities = 35,900

Additional site costs = $400 \times 35 \text{ days} = 14,000$

Therefore, total cost = $35,900 + 14,000$

= Sh. 49,900

b)

Year	Cash in	PV Factor (12%)	PV
0	-200000	1	-200000
1	120000	0.893	107142.9
2	60000	0.797	47831.63
3	120000	0.712	85413.63
		NPV	<u>+40388.12</u>

Payback period = $2 + \frac{20000 - 180000}{120000} = 2.167 \text{ yrs}$

Comment

The project pays back in a relatively short period of time.

It has a large positive NPV. Given that it is prudent to invest in projects whose NPV is greater than 0, thus the project is viable.

SUGGESTED SOLUTIONS TO MOCK 4

QUESTION ONE

a) Computer Aided Design (CAD) techniques

These refer to techniques that automate the creation and revision of designs using sophisticated graphics software.

b) Potential benefits:

1. **Quality designs.** CAD ensures accuracy in the production of designs. CAD also subjects designs to rigorous testing thus ensuring reliability.
2. **Speed in designing.** Since the design process is automated, it's likely to be shorter than manual design.
3. **Improved group collaboration.** CAD enables sharing of designs amongst many designers thus improving group collaboration.

4. Reduced costs

Using a traditional physical design methodology, each design modification requires a mold to be made and a prototype to be physically tested. This process must be repeated many times, which is very expensive and time consuming. Using a CAD workstation, the designer only needs to make a physical prototype toward the end of the design process because the design can be easily tested and changed on the computer.

c) Physical security procedures that may be adopted:

1. **Bolting door locks** –These require the traditional metal key to gain entry. The key should be stamped ‘Do not duplicate.’
2. **Combination door locks** –These utilize a numeric keypad or dial to gain entry. The combination should be changed at regular intervals or whenever an employee with access is transferred, fired or subject to disciplinary action.
3. **Electronic door locks** –These utilize a magnetic or embedded chip-based plastic card key or token entered into a sensor card reader to gain access. A special code internally stored in the card or token is read by the sensor device that activates the door locking mechanism.
4. **Biometric door locks** – An individual's unique body features, such as voice, retina, fingerprint or signature, activate these locks.
5. **Manual logging** – All visitors should be required to sign a visitor's log indicating their name, company represented, reason for visiting and person to see. Logging should be at the front reception desk and at the entrance to the computer room.
6. **Electronic logging** –All access should be logged with unsuccessful attempts highlighted.
7. **Identification Badges (Photo Ids)** –Badges should be worn and displayed by all personnel. Visitor badges should be a different colour from employee badges for easy identification.
8. **Video cameras** –They should be located at strategic points and monitored by security guards.
9. **Security guards** –They could be used together with video cameras for efficiency.
10. **Controlled visitor access** –All visitors should be escorted by a responsible employee.
11. **Alarm systems** –should be linked to inactive entry points, motion detectors and the reverse flow of enter or exit only doors.
12. **Controlled single entry point** –A controlled single entry point monitored by a receptionist should be used by all incoming personnel.

QUESTION TWO

- a) (i) Protocol - D
(ii) Half duplex – A
(iii) Fibre optics – B
(iv) Simplex – A
(v) Analog signal – D
(vi) Microwave – B
(vii) Bandwidth – C
(viii) Start/Stop bit – D
(ix) Asynchronous – D
(x) Voice Band -B

b) Internetworking

This refers to the linking of separate networks, each of which retains its own identity, into an inter-connected network. An interconnected network may consist of an organizational network linked to other organizational networks, to the Internet, to the networks of public telecommunication service providers or to other public networks via a backbone.

c) Call-back unit

When a terminal requests for access to another terminal and authenticates itself, the call-back mechanism interrupts the telecommunications dial-up connection to the other terminal by dialing back the caller (requesting terminal) to validate the terminal's identity.

Call-back units thus prevent terminals from masquerading i.e. falsifying their identities so as to gain additional privileges or access to otherwise forbidden data or systems.

Data Encryption Equipment

These enable data encryption i.e. the process of converting data (plain text) into a secure coded form (cipher text) that cannot be understood without converting back via decryption (the reverse process) to plain text again. Messages can thus be encrypted before they are sent to prevent eavesdropping on messages in transit in a network. Data encryption could also be used to protect data stored on servers from disclosure to intruders (unauthorized users) who have already gained access to the server.

QUESTION THREE**a) Microprocessor**

This refers to a semiconductor chip that integrates all of the memory, logic and control circuits for an entire Central Processing Unit of a computer onto a single chip. Microprocessors come in the form of a Silicon chip mounted on an electronic circuit board. The semiconductor chip that constitutes a microprocessor consists of thousands of transistors. The transistors operate as electronic switches each having two binary states (ON or OFF). Examples of microprocessors common in today's market are the Intel Pentium III chip and the Intel Pentium IV chip.

Distributed data processing

This refers to a mode of processing that distributes the computer processing work among multiple computers linked by a communication network. A common example of distributed processing is client/server computing which splits processing between clients and servers. Both are on the network, but each machine is assigned functions it is best suited to perform. The client is the point of entry for the required function. The server provides the client with services e.g. storage and processing of data, and also management of network activities.

Direct Access backing storage

Backing storage refers to that which supplements the main memory. A direct access backing storage device is one that allows for data to be retrieved by going to the exact position of the data without following any order. This mode of access is made possible because each location on the storage medium has a unique address and thus the read/write head can go directly to the required location. Examples of direct access backing storage devices are magnetic disks (Hard disks and floppy disks).

Batch processing

This refers to a mode of processing data in which transactions are accumulated and stored until a specified time when it is convenient or necessary to process them as a group. An example of a batch processing system is a payroll system.

Time sharing

This refers to the sharing of computer resources by many users simultaneously by having the CPU spend a fixed amount of time on each user's program before proceeding to the next. Thousands of users are each allocated a tiny slice of computer time, when each is required to perform any operation. At the end of this period, another user is given another time slice of the CPU. Time-sharing is facilitated by most modern operating systems.

QUESTION FOUR

a) Reasons for user resistance:

1. Parochial Self-Interests

Users may resist a computer-based information system because they may perceive it as a threat to their current job, power, etc

2. Differing Perceptions Or Assessments

Managers could view the computer-based system as vital to organizational efficiency while operations staff may view a computer-based system as a nuisance to their normal operations thus leading to their resistance to the system.

3. Ignorance

Users could resist the introduction of a computer-based information system due to lack of knowledge of the potential benefits of the system.

4. Mistrust And Suspicion

Users could view the computerization of the information system as an opportunity for downsizing the labour force and thus they will tend to resist.

5. Lack of Involvement of Users in the Computerization Initiative.

When users are not involved, they feel left out and thus they resist in protest to management.

6. Need To Re-skill

The need to re-skill due to the introduction of the computer based information system may discourage users particularly when some of them feel that they won't be able to cope with the new demands due to their age.

b) Probable solutions to the problem of user resistance:

1. User Involvement And Participation In The Change

Users could be involved in the design and implementation of a project so as to make them feel that they have a stake in the project.

2. Communication and Education

The users need to understand the need for change as well as the logic behind it.

3. Facilitation And Support Of The Change

Support from management in the form of specialized training, job-stress counseling, and compensatory time offs could be used to reduce the negative effects of the change.

4. Negotiation And Agreement.

Management could negotiate with user representatives and offer them incentives such as promotions in exchange for their cooperation in the change.

5. Manipulation And Cooptation

Manipulation occurs when the management holds back information and consciously events to increase chances of success of a change. Cooptation involves token participation. Those who are co-opted cannot claim that they haven't been consulted yet the ultimate impact of their input is negligible.

6. Explicit And Implicit Coercion

Management could force the change through coercive means e.g. salary reduction and job losses. This technique is used where speed is essential and the change initiators possess considerable powers. This technique is recommended as the last alternative to dealing with user resistance.

QUESTION FIVE

a) Closed system

This system has no interaction with the environment. It neither transmits information to the outside world nor receives any information from the outside world. It's mainly a scientific concept e.g. Physics experiments.

Open System

This system interacts with its environment. It is a system with a feedback mechanism that promotes free exchange of information between the system and the external entities. Organizations are good examples of open systems.

b) Deterministic system

They operate in a predictable manner e.g. thermostats and computer programs.

Probabilistic Systems/Random Systems

With these systems, it's not possible to determine the next state of the system even if the current state is known. An example is a doctor's diagnostic system.

c) Open-loop system

This refers to a system that does not act in a controlled manner, that is, there is no feedback loop, and so no measure of performance against standards.

CLOSED-LOOP SYSTEM

This refers to a system that functions in a controlled manner. Such a system accepts inputs, works on them according to some predefined processing roles and produces outputs. Such a system is controlled via a feedback loop.

d) Human system

This refers to a system that is composed of human beings. An example is a soccer team.

MACHINE SYSTEM

This refers to a system that is of mechanical components e.g. gears, propellers, exhaust pipe, etc. A good example of a machine system is a car engine.

QUESTION SIX

- a) Computer fraud arises when a person gains access to or uses a computer program or data or computer to deceive or defraud others.

Methods and tools that are useful in stemming computer fraud by employees:

1. **Strict division of duties** –Eases supervision/monitoring.
2. **Strict control over input, processing, and programs.**
3. **Shielding Visual Display Units** to prevent people with detection equipment that is able to remotely view what is being displayed on the VDU.
4. **Use of logon-Ids and passwords** to prevent unauthorized access.

5. **Logging computer access** –Review of the security logs could identify patterns or trends that indicate computer fraud.
6. **Biometric access security control.**
7. **Dial-back procedures.**
8. **Video cameras** to enable detection of physical unauthorized access.
9. **Security guards** to prevent physical unauthorized access.
10. **Alarm system** to prevent physical unauthorized access, etc.

b) How theft of computer time may be minimized:

1. **Logging of access** –This would enable the organization to identify instances where computer resources were used without authorization and take appropriate action.
2. **Electronic door lock access systems**, which are capable of denying access to an individual depending on the current time. These ensure that employees do not use computer rooms outside work hours.
3. **Security guards.** The guards could be instructed to deny employees entry to the firm's premises outside working hours.
4. **Automatic log-off systems.** These automatically log-off the user when the allocated time has expired or when a user is trying to gain access outside the allocated computer usage times.
5. **Username and passwords** could be granted to authorized employees thus preventing unauthorized employees from using an organization's computers.
6. **Controlled single entry points to computer rooms.** A controlled entry point monitored by a receptionist should be used by all incoming personnel. In this way, the receptionist could be used to monitor the employees accessing the computers and the times in which access is taking place.

QUESTION SEVEN

a) System flow chart

This describes the data flow for a data processing system. It provides a logical diagram of how the system operates. It represents the flow of documents and the operations performed in a data processing system. A system flowchart also reflects the relationships between inputs, processing and outputs.

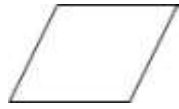
Program flow chart

It represents in detail, the various steps to be performed within the system for transforming the input into output. The various steps are logical/arithmetic operations, algorithms, etc. Program flowcharts serve as the basis for discussions and communication between the system analysts and programmers. Program flowcharts are quite helpful to programmers in organizing their programming efforts. These flow charts constitute an important component of documentation for an application.

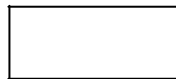
b) A probable system flowchart for the payroll

system: Diagramming convention used – NCC

convention. NCC system flowchart symbols:



Document, report or form.



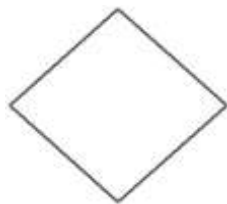
Operation or task



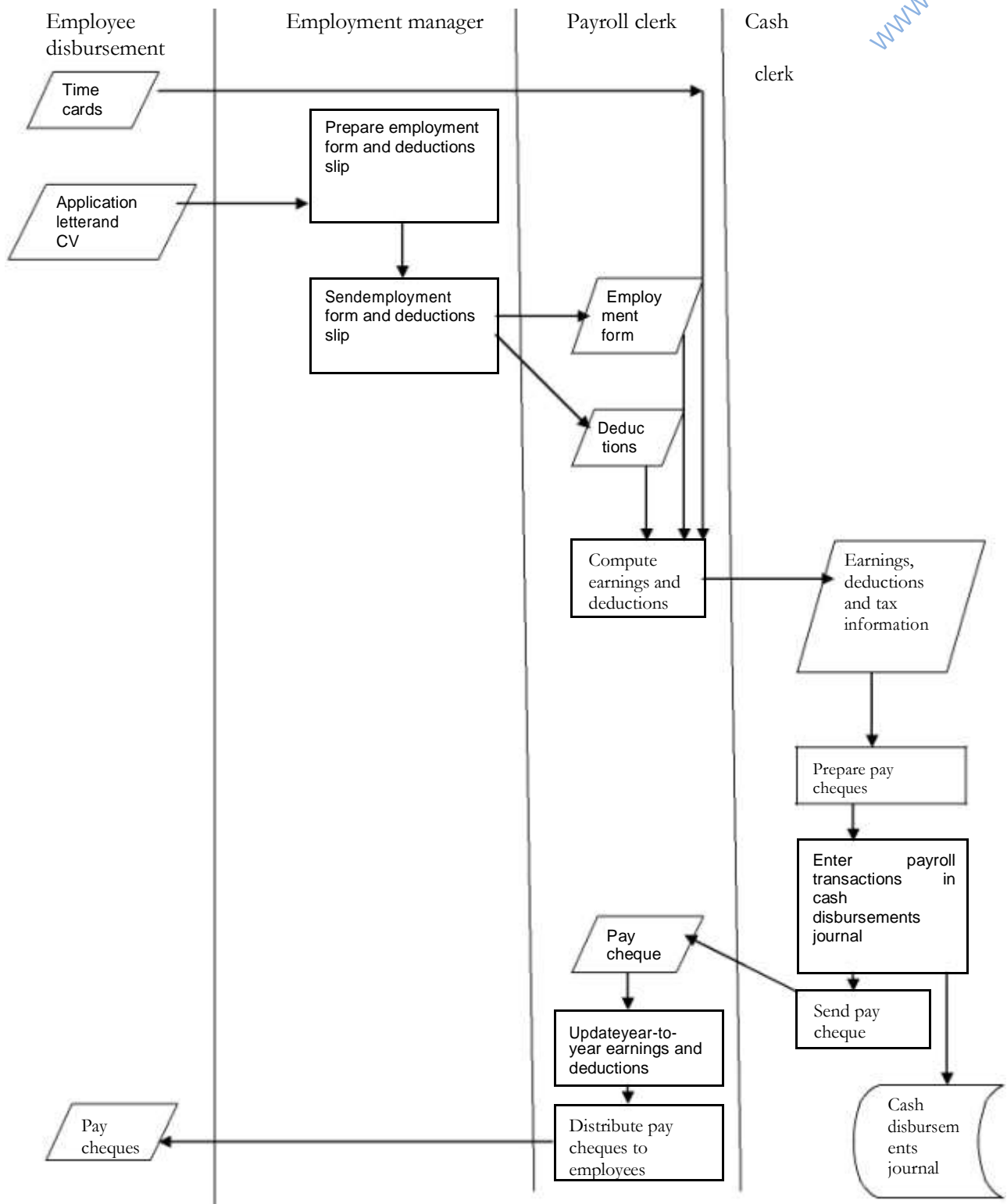
Data flow



Data store or file



Decision



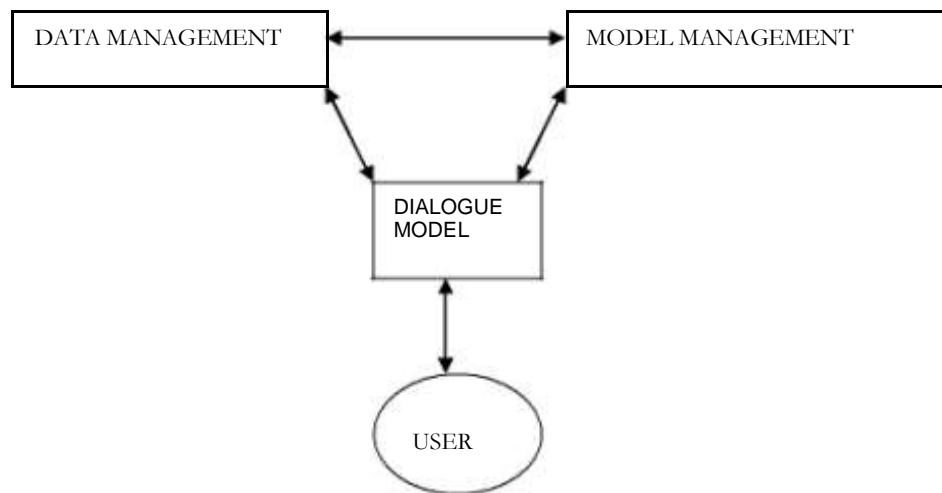
QUESTION EIGHT**a) (i) Decision Support System (DSS)**

These are information systems that support managers in day-to-day decision-making and most of them are used in semi-structured problems. DSSs emphasize on small simple models, which can be easily understood and used by managers rather than complex integrated systems which need information system specialists to operate. They cut across both data support and transaction processing.

(ii) DSS software components:

3 main components:

1. The data management subsystem (the database)
2. The dialogue/use interface subsystem
3. The model management subsystem

Diagram:

The dialogue model is basically a user interface at which the user enters data into the system or views data from the system.

The data management component consists of current or historical data from a number of applications or groups. It may be in the form of a small database residing on a PC that contains a subset of corporate data that has been downloaded and possibly combined with external data. Alternatively, the DSS database may be a massive data warehouse that is continuously updated by major organizational transaction processing systems (including enterprise systems and data generated by website transactions). The data in DSS databases are generally extracts or copies of production databases so that using the DSS does not interfere with critical operational systems.

The model management component consists of a system that maps data to models in order to produce results that could be used to support decision-making. A model is an abstract representation that illustrates the components or relationships that illustrate the components or relationships of a phenomenon. A model could be a physical one (such as a model airplane), a mathematical one (such as an equation) or a verbal one (such as a description of a procedure for writing and order).

b) (i) Expert system

This is a knowledge-intensive computer program that captures the expertise of a human in limited domains of knowledge. An expert system could assist decision-making in an organization by asking relevant questions and explaining the reasons for adopting certain actions.

(ii) Advantages of expert systems in decision-making:

1. Enable high quality decisions to be made.
2. They reduce the number of decision makers since they partly automate the process of decision-making. This implies lower labour costs.
3. They ensure accountability since they provide reasons for proposing an action.
4. Since they support managers in decision-making, they enable decisions to be made within a short time period.
5. Since expert systems capture human expertise, they enable organizations to fully retain intellectual resources for future decision-making.

SUGGESTED SOLUTIONS TO MOCK 5**QUESTION ONE****a) Types of systems:**

1. Physical vs. abstract systems
2. Complex vs. simple systems
3. Open vs. closed systems
4. Open loop vs. closed loop systems
5. Stable/static systems vs. dynamic systems
6. Adaptive systems vs. non-adaptive systems
7. Deterministic vs. probabilistic systems
8. Permanent vs. temporary systems

b) (i) Differentiation**(ii) Equifinality**

This refers to the way open systems can achieve their objectives in a variety of ways using varying inputs, processes and methods.

(iii) Feedback

This is a control mechanism in open systems. Feedback involves measuring the output of the system, comparing the output with a standard and using any difference to modify subsequent input to ensure the output conforms to the required standard.

(iv) Transformation**(v) Entropy**

This refers to the tendency towards disorder (chaos) in a system. The more closed a system, the greater the entropy.

c) (i) Features of the classical theories of organizations:

1. They emphasize on the structure of organizations, the management of structures and control of production methods.
2. They have a tendency of treating organizations as closed systems.

(ii) Features of human relational theories of organizations:

1. They focus more on the human element of the organization. They treat an organization as a social system, a system of cliques, grapevines, informal systems, rituals and a mixture of logical and non-logical behaviour.
2. They are based on a series of experiments by researcher Mayo at the Hawthorne Western electric in the 1920's.

3. They aim to foster system efficiency by addressing factors determining motivation of staff e.g. Maslow's hierarchy of needs, Frederick Herzberg's theory.

(iii) Features of the contingency approach to organizations:

1. They treat an organization as a unique system resulting from an interaction of subsystems with the environment. The motto of the contingency theory is, —it all depends!!.

QUESTION TWO

a) Observation

This method of fact-finding requires the analyst to participate in performing some activities carried out by the user. The analyst may choose to watch as the users perform their activities and gather the facts intended. Guidelines when using observation include:

- There should be permission from concerned authorities before this exercise.
- Gathered facts should be recorded.
- Those to be observed should be notified and the purpose of the exercise explained.
- The analyst should be objective and avoid personal opinion. He should have an open mind.
- The analyst should record ordinary events.

Observation is best used in the following circumstances:

- When the validity of facts gathered through other methods is questionable.
- When the complexity of certain aspects of a system prevent a clear explanation by the respondents or user.
- Used to confirm that the procedures specified in the manual are being followed.
- When one needs to obtain first hand and reliable information.

b) Questionnaire

A questionnaire is a special document that allows the analyst to ask a number of standard questions set to a large number of people in order to gather information from them. Questionnaires are used when:

- The system analyst is located at a considerably long distance from the respondent.
- There are a large number of respondents such that interviewing them will be limited by time.
- The questions to be asked are simple and straightforward and require direct answers.
- Limited information is required from a large number of people.
- It's used as a means to verify facts along other methods.

c) Searching records

This is a fact-finding technique that involves perusing through literature or documents to gain a better understanding about the existing system. Examples of documents that are perused include sales orders, job descriptions, existing systems documentation, management reports, procedure manuals, organization structure charts, trade journal, etc.

Searching is best used when:

- The analyst needs to have a quick overview of the existing system.
- The information required cannot be obtained through any other technique.

d) Statistical sampling

This refers to the systematic selection of representative elements of a population. The selected elements are examined closely and the results assumed to reveal useful information about the entire population.

Statistical sampling is used when the target population:

- **Is too large and it's impractical to examine every document or talking to everyone** in the organization to gather facts.
- Contains homogenous elements (elements with similar characteristics).
- Time is limited.

QUESTION THREE

a) (i) Recommendations on physical measures:

1. Use of receptionists and guards to control access to computer rooms.
2. Use of mechanical locks and keys to control access to computer rooms.
3. Use of electronic systems such as electronic door locks to control access.
4. Computer buildings should be designed unobtrusively as possible- notices which identify the function of the building should be avoided.
5. Cameras could be used to detect break-ins into the organization.
6. **Computer terminal locks could be used to prevent the organization's computers** from being turned on or the keyboards from being used.
7. Alarms could be used to detect break-ins.
8. Report/documents distribution carts should be covered and locked and they should not be left unattended.

(ii) **“Back up”** refers to the process of maintaining a duplicate copy of the data of an information system at the same site or at a remote site as a contingency measure in case the original copy of the data is lost or destroyed.

—Back upll thus secures and information system's data from loss or destruction by providing an additional copy of the data.

“Uninterruptible Power Supply” (UPS)

This prevents the loss of unsaved data during power blackouts by providing an alternative supply of power. Users working on the computer can thus working on the computer

—uninterruptedll.

UPSs secure an information system from data loss due to power failure. Before a power blackout, data that is being worked on is normally held in the primary memory (RAM). RAM is usually volatile meaning that the presence of data depends on the availability of power. UPSs restore supply of power immediately after a blackout has occurred thus ensuring that data held on RAM is not lost.

They also secure information system equipment from damage due to voltage surges.

(iii) Security features of most operating systems:

1. Logon-Ids And Passwords

This feature is provided by operating systems such as Windows 2000, Windows XP, Linux and Unix. Such operating systems prompt the user to supply a logon-Id and password before he/she can be granted access to system resources.

2. Audit Trails

These enable attempts at unauthorized access to be logged.

3. Data Encryption

Most operating systems provide a facility for data encryption to protect data that is stored on a computer or data in transit. With data encryption, the data is coded using a key and it can only be decoded by a user possessing the decoding key.

4. File Access Permissions

Operating systems could restrict the operations performed on a file (e.g. read, write, modify) or the type of users who can access a file (e.g. normal user, administrator or power user) based on preferences supplied by the systems administrator.

5. FILE RECOVERY UTILITIES e.g. Recycle Bin in Windows range of operating systems.

These enable accidentally deleted files to be recovered since all deleted files are directed to a temporary storage location before they are permanently removed from the system.

(iv) Disasters that an information system should be guarded against:

1. Utility outages e.g. power blackouts.
2. Equipment failure.
3. Viruses i.e. programmed threats.
4. Water, leaks, toxic spills.
5. Foreign intelligence.
6. Human error.
7. Disgruntled employees.
8. Dishonest employees.
9. Greedy employees who sell information for financial gain.
10. Outsider access- hackers, crackers, criminals, terrorists, consultants, ex-consultants, ex-employees, competitors, government agencies, spies (industrial, military, etc), disgruntled customers
11. Acts of God/Natural disasters- earthquakes, floods, hurricanes.
12. Accidents, fires, explosions.

(v) Importance of an information security (IS) policy to an organization:

1. To provide guidelines to organizational staff on information security procedures.
2. The presence of an IS policy shows that the organization is committed to ensuring integrity of the information it handles. This thus enhances a company's corporate image.
3. An IS policy could be used as evidence to show that an organization did its best to provide information security in cases where law suits are filed against an organization.
4. When followed, an IS policy could actually ensure that the IS is secure from most of the threats it faces.

b) (i) Computer

This is a generic term applied to a variety of malicious computer programs. These malicious programs affect other computer programs and data in a computer system.

(ii) Antivirus tools:

- Norton anti-virus software;
- McAfee;
- AVG, etc.

(iii) Administrative measures that may be used to check the threats of computer viruses:

1. Update virus scanning definitions frequently;
2. Have vendors run demonstrations on their machines, not yours;

3. Shareware should not be used without first scanning the shareware for a virus;
4. Review of anti-virus policies and procedures at least once a year;
5. Field technicians should scan their disks on a test machine before they use any of their disks on the system;
6. The network administrators should use workstation and server anti-virus software;
7. A virus eradication procedure should be prepared and a contact person identified;
8. Users should be educated about virus policies and procedures;
9. Commercial software should be scanned before it is installed to detect Trojan horses (viruses or worms);
10. Systems should be built from original, clean master copies. Booting should be from original diskettes whose write protection has always been in place;
11. All diskettes with .EXE or .COM extensions should be write protected;
12. All servers should be equipped with an activated current release of the virus detection software.

(iv) Environmental factors that should be controlled so that they don't affect the operation of the computer:

1. **Ventilation**- it should be adequate to prevent hardware equipment from overheating.
2. **Dust**- should be minimized. Dust could damage a hard disk by resulting in a disc crash if it's allowed to accumulate inside the computer system unit.
3. **Moisture**- should be minimized to avoid damage of equipment through short circuits.

QUESTION FOUR

a) A system is a set of interacting components that work together to accomplish specific goals. Systems may be identified from specific characteristics. The main systems characteristics include:

- Purpose
- Rationale
- Efficiency
- Effectiveness
- Inputs
- Outputs
- Transformation roles
- Feedback
- Throughput
- Boundary
- Environment
- Interfaces

Therefore a business organization may be considered as a system because it exhibits the characteristics of a system. With reference to Onyango Wholesalers, these are:

1. Purpose

Onyango Wholesalers' purpose is to buy goods from suppliers and sell them in bulk to customers. This is facilitated through its sales office and accounts office.

2. Rationale

The justification for the existence of Onyango Wholesalers is the need to make profit.

3. Input

Onyango Wholesalers has supplier delivery notes, supplier invoices and payments from customers as inputs.

4. Environment

Onyango Wholesalers exists in a business environment containing other business systems such as the suppliers and also individual entities such as customers. Nairobi is the business environment for Onyango Wholesalers.

5. Interfaces

Onyango Wholesalers has a meeting point with the suppliers system where inputs and outputs are shared. It also has a meeting point with the customers where inputs and outputs are shared.

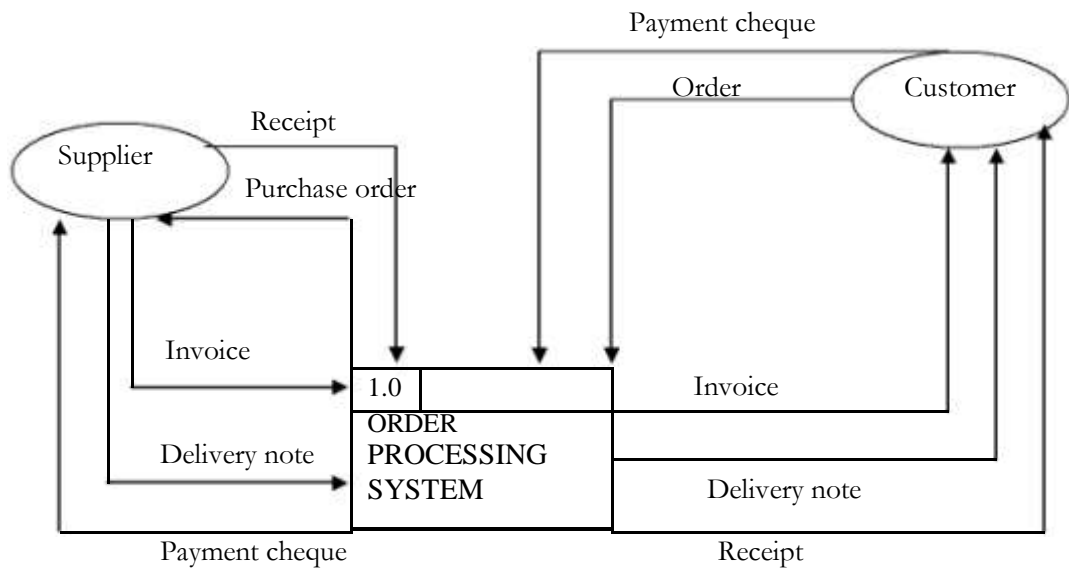
6. Transformation rules

Onyango Wholesalers has well defined rules that specify how the input is processed to produce output. For instance, a customer order is passed onto the sales office which verifies if there is sufficient stock before preparing a delivery note which is forwarded to the accounts office where an invoice is prepared which accompanies the goods from the store together with the delivery note to the customer who then prepares a cheque for Onyango Wholesalers Ltd.

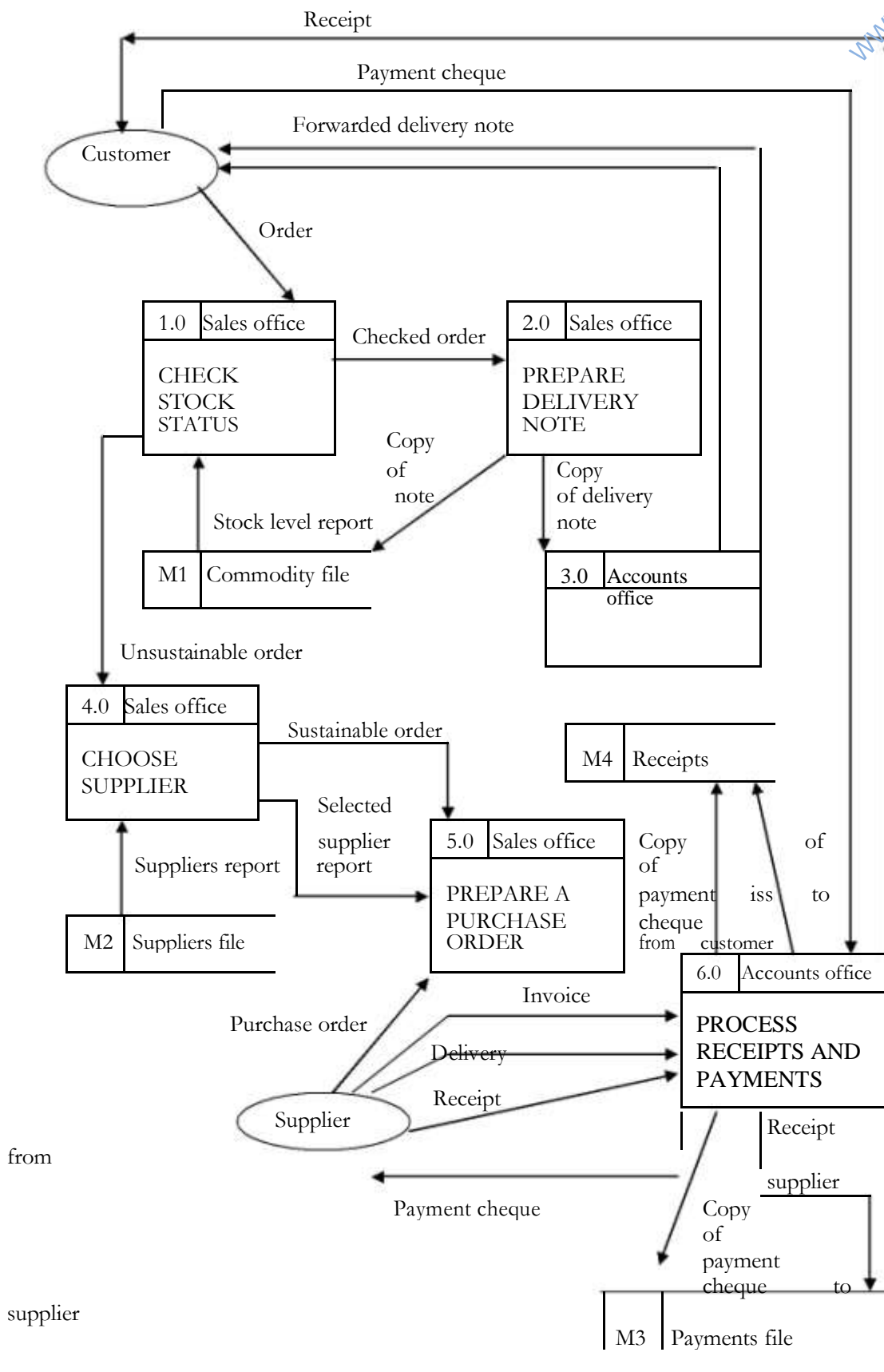
7. Boundary

Onyango Wholesalers has a boundary that is its organizational boundary (geographical boundary).

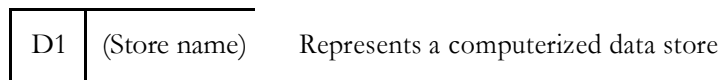
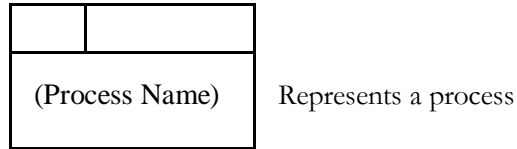
b) Context level diagram:



Level 1 current physical DFD:



Note: The notations used were borrowed from the Structured Systems Analysis and Design Methodology (SSADM). These are:



QUESTION FIVE

a) Cache memory

This refers to a high-speed memory that a processor can access more quickly than RAM. Frequently used instructions are stored in cache since they can be retrieved more quickly improving the overall performance of the computer. Level 1 (L1) cache is located on the processor; Level 2 (L2) is located between the processor and RAM. Cache memory is very expensive and thus the size of this memory in the computer relative to the primary and secondary memory is very small.

b) Coprocessor

This refers to an additional processor that is used to perform specialized activities within the system. The coprocessor within a system is able to ensure that the coprocessor is more efficient in undertaking certain activities. An example of a coprocessor is a math coprocessor. The math coprocessor helps the main processor to perform mathematical computations.

c) Device driver

This refers to a program that allows a specific device such as a modem, network adapter, or printer, to communicate with the operating system. Device drivers are specific to the make and model of the device. They are supplied in compact disks or diskettes together with the devices they represent when the devices are sold to the customer.

d) Disk caching

This refers to a technique that is used to improve the access time (time that it takes to access data) for a hard disk. Disk caching utilizes a disk cache which may be part of the hard disk or a specified portion of Random Access Memory (RAM). The disk cache holds data that has been recently read and, in some cases, adjacent areas that are likely to be accessed next.

e) Expansion board

This refers to an electronic circuit that enables a user to add to the features of a computer system. In order to add a feature to a computer system, the required electronic board is

plugged into the motherboard (main electronic circuit board in the computer system) by making use of expansion slots (sockets within the motherboard). Expansion boards may be used to increase computer memory and also, to improve the visual capability of a system, to add an audio capability to the system, to increase disk space of the system, etc.

QUESTION SIX

a) (i) Transaction processing systems (TPSs)

These are computerized systems that perform and record daily routine transactions necessary to conduct the business. An example is a point of sale system. Transaction processing systems serve the operational level of an organization. The inputs to a TPS are transactions and events. The processing consists of listing, sorting, merging, and updating. The outputs are detailed reports, lists and summaries. TPSs specifically serve operational personnel and supervisors. They enable supervisors to make structured decisions by the reports they provide e.g. a decision to restock based on the stock levels report.

(ii) INFORMATION COMMUNICATION TECHNOLOGY (MISs)

These are information systems at the management level of an organization that serve the functions of planning, controlling and decision making by providing routine summary and exception reports. The inputs to an MIS include summary transaction data, high volume data and simple models. The processing consists of routine reports, simple models and low-level analysis. The information outputs include summary and exception reports. MISs specifically serve middle managers. They enable them to make structured decisions.

(iii) Decision Support System (DSSs)

These are information systems at the organization's management level that combine data and sophisticated analytical models or data analysis tools to support non-routine decision making. The information inputs to a DSS include low-volume data or massive databases optimized for data analysis, analytical models and data analysis tools. The processing consists of interactive simulations and analysis. The outputs consist of special reports, decision analyses and responses to queries. DSSs specifically serve professionals and staff managers. They enable them to make unstructured decisions e.g. business contract analysis, corporate planning and forecasting.

(iv) Executive Support Systems

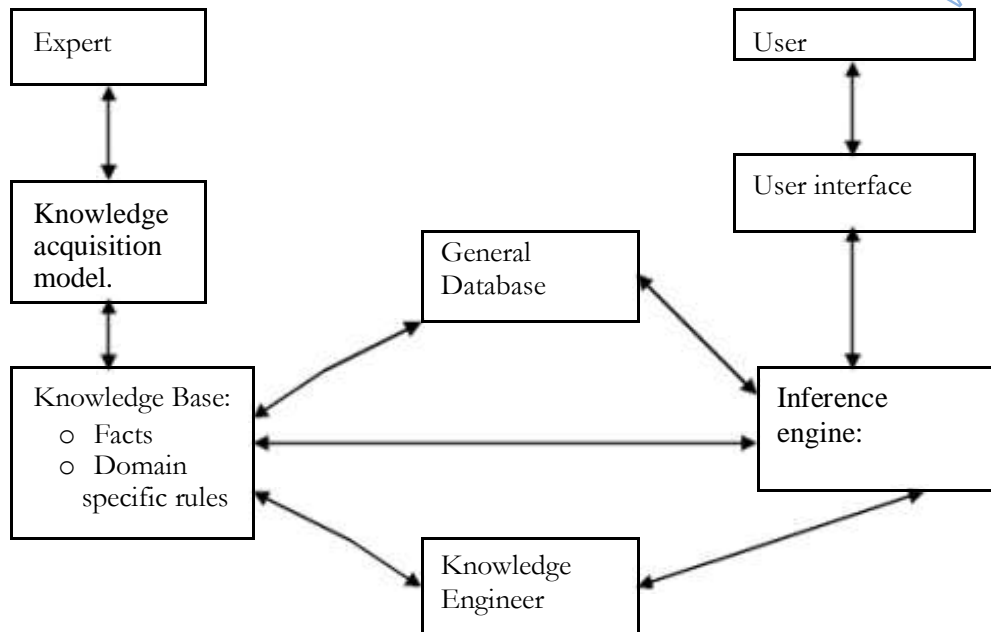
These are information systems at the organization's strategic level designed to address unstructured decision making through advanced graphics and communication. ESSs have aggregate external and internal data and information inputs. The processing is interactive and it's characterized by graphics and simulations. The information outputs of an ESS include projections and response to queries. ESSs specifically serve middle managers. They enable them to make unstructured decisions e.g. processing a loan application.

b) Expert system

This is a knowledge intensive program that captures the expertise of a human in limited domains of knowledge.

Components of an expert system:

These may be illustrated in the following diagram:



This is a database of knowledge extracted from experts, usually with the help of a computer specialist, the knowledge engineer. It consists of:

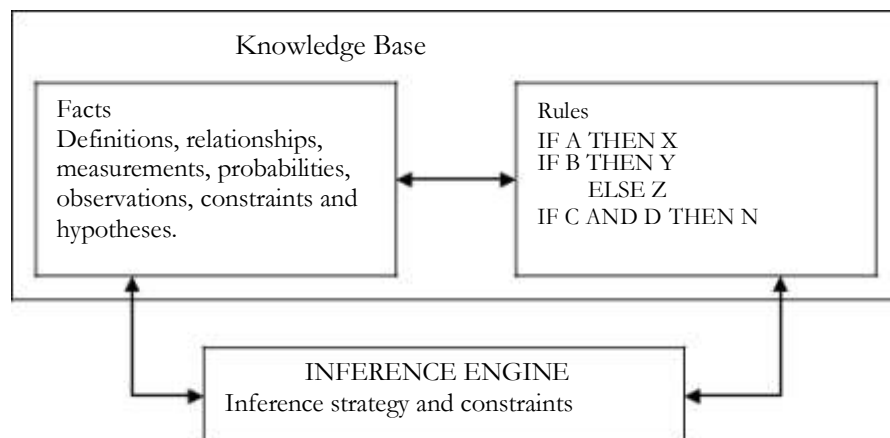
- Facts about a specific domain
- Rules of thumb

General database

This contains relevant common knowledge such as historical information, statistical data, coefficients, constants, etc

Inference engine

This is the software component of the expert system that evaluates and manipulates facts and rules in the knowledge base. It then makes associations and inferences resulting in a recommended action for a user.



Knowledge acquisition model

It's used by experts to enter facts and rules into the system. This usually happens with the assistance of the knowledge engineer.

Explanatory Interface (Part of the User Interface)

This shows the trail of reasoning used to reach a decision. It outlines facts used, the rules applied and the order of application.

People resources

They are classified into 2:

- The development team consisting of experts and the knowledge engineer.
- The users.

Uses of expert systems in business applications:

1. Medical underwriting systems for health insurance firms.

These could be used to underwrite applicants for health insurance after assessing their eligibility and medical risks.

2. Loan underwriting systems

These could be used to make credit worthiness decisions on loan requests.

3. Investment banking systems

These could be used to ensure that financial advisers of such institutions respect their clients' preferences (e.g. which stocks or which sectors to exclude when making purchases). This is achieved through a rule-based system that maintains rules keeping a particular stock item from entering a client's portfolio.

4. Insurance claim estimation systems

They attempt to produce an accurate estimation of insurance claims.

5. Customer service systems

They direct customer enquiries to a specific source of help without delay.

QUESTION SEVEN

a) Protocol

It refers to a set of communication rules for exchange of information. Protocols define speeds and modes for connecting one computer with another computer. An example of communication protocols is the Open System Interconnection (OSI) set of communication protocols which are used to identify functions provided by any network and to separate each network function into seven layers of communication roles.

b) (i) Multiplexors

These are communication devices that multiplex (combine) several signals for transmission over a single medium. A demultiplexor completes the process by separating multiplexed signals from a transmission line. Frequently, a multiplexor and demultiplexor are combined into a single device capable of processing both incoming and outgoing signals.

(ii) Acoustic coupler

This is a device used to connect a modem to a telephone line via an ordinary handset. The acoustic coupler converts electrical signals from the modem to sound via a loudspeaker, against which the mouthpiece of a telephone handset is placed. The earpiece is placed against a microphone which converts sound to electrical signals which return to the modem. The handset is inserted into a sound-proof box containing the loudspeaker and microphone to avoid interference from ambient noise. Acoustic couplers are rarely used today since most modems have a direct electrical connection to the telephone line.

(iii) Line concentrators

These are devices that combine data streams from many simultaneously active inputs into one shared channel in such a way that streams can be separated after transmission. The concentrator's output bandwidth must be at least as great as the total bandwidth of all simultaneously active inputs. A concentrator is one kind of multiplexing device.

- c) (i) How an ISDN may be used in a business organization: ISDN

This refers to a suite of internationally adopted standards for end-to-end digital communication over a public telephone network. ISDN specifically refers to protocols that are utilized in order to provide potential for universal digital network with a series of standard interphases that will facilitate the connection of a wide variety of telecommunications equipment to the network. ISDN has the objective of making the network digital so that a variety of communications can be undertaken within the same line. ISDN is capable of integrating a variety of services for voice, data, video, images, etc on the same communication line. Through ISDN therefore, it's possible to make use of one line for a variety of activities.

Business applications of ISDN include:

1. Videoconferencing

ISDN supports the real-time exchange of voice and video. This may be useful in meetings where the participants are in different geographical areas.

2. Shared electronic chalkboards

Ideas and illustrations can be distributed in real-time to remote locations so that people in other cities or other countries can participate in meetings.

3. Telecommuting

ISDN provides facilities for users to tap into central network resources from the privacy of their own homes and do so with the functionality of a network node.

4. Transmission of large amounts of data

For example transmitting the contents of a newspaper from the editorial office to the printers.

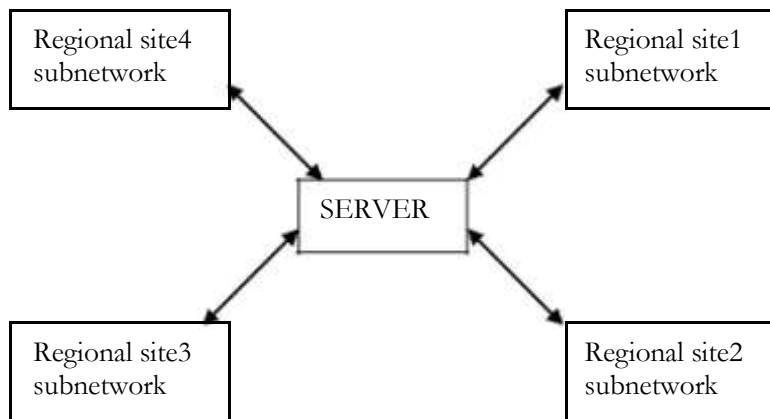
5. Computer-based training

ISDN supports the speedy broadcast of data from the node in the network where training is being carried out.

- (ii) I would recommend a star network

STAR NETWORK

In this network, there are a number of processing sites linked to a central unit, which may be a host computer or file server. The four regional sites would constitute the processing sites. It may be noted that each regional site may consist of a subnetwork of computers. In addition to facilitating communication, the function of the central unit would be to provide control over the network. It could for instance be used to administer security over the network since all the regional sites are linked to it. The central unit could also be used to provide shared data storage in the form of a shared database of records for all the regional sites. Data processing could thus be distributed over the regional sites with the central unit being invoked only during exchange of messages between regional sites or when reference is being made to data stored on the central unit. The star network could take the following configuration:



QUESTION EIGHT

- (i) Major features of a 4GL:
- (ii) Advantages accrued by an organization that lets users be involved in developing information systems applications:

1. Cost reductions

Organizations cut down on costs that would have arisen if they were to use experienced programmers to develop the applications.

2. Improved decision making

Managers are able to improve the quality of their decisions through timely information supplied by management reporting systems developing through end user computing.

3. Increased user motivation

Because management trusts end-users develop their own small systems, users feel motivated to be innovative. Motivated users are capable of producing quality systems.

4. Acceptable systems

By letting users to develop their own systems, an organization is guaranteed that its systems will be acceptable to users since it's the users who understand their needs best.

5. Greater operational efficiency

Since end-user development is likely to lead to acceptable systems being produced, employees who use the systems they've developed are likely to have a greater job satisfaction from using the developed systems. Increased job satisfaction leads to employee motivation which may lead to improved organizational efficiency.

6. No user resistance

Adoption of end-user developed systems does not face user resistance since users were involved with coming up with such systems.

PART IV: Revision Questions and Answers

QUESTIONS

PAPER 1

QUESTION ONE

Consider a supermarket chain and the use they may make of information systems in the running of their business. Some of the objectives they are faced with are: -

- a. Easy product identification;
- b. Fast customer processing at the cash tills;
- c. Extremely efficient stock control;
- d. Rapid bulk replacement of goods from suppliers.

Describe in detail how Information Systems can help supermarket chains with these specific objectives. Your answer should outline the systems involved, the hardware that might be required and an indication of how the various systems might interact with each other.

(5 marks for each, total marks 20)

QUESTION TWO

The development of powerful desktop computers coupled to telecommunication networks has revolutionized the way organizations may carry out their business.

The following are some alternatives for an organization's internal and external communications: -

- a. Client-Server (8marks)
- b. Internet (6marks)
- c. Intranet (3marks)
- d. Extranet (3marks)

(Total marks 20)

QUESTION THREE

In the context of Information Systems Security, write short notes on ALL of the following headings:-

- a. Why are computer systems more vulnerable to destruction, error, abuse and misuse than manual systems?
- b. What is meant by the term Risk Assessment?
- c. What are Worms and Viruses?
- d. Outline the process of Public Key Encryption.

(5 marks for each, total marks 20)

QUESTION FOUR

Organizations are now moving from Strategic Management systems towards Enterprise systems and yet further to Industrial Networks and Extended Enterprise systems.

- a. Describe the features of Enterprise computing and industrial networks;
- b. What are the business and technological reasons for this move?
- c. Outline the key elements required to build an enterprise information technology structure

- d. Outline potential organisational problems in the creation of these enterprises systems.
(5 marks for each, total marks 20)

QUESTION FIVE

In the context of ethical considerations: -

- a. Outline the individual ethical issues implied when a person joins a professional organization. (10 marks)
b. Describe some of the ethical dilemmas that are involved with Information Systems. (10 marks)

(Total: 20 marks)

QUESTION SIX

- a) A major source of errors in computer systems is errors in the input data. What controls would you install for the control of such errors? (6 marks)
b) Describe four methods that would be used for fact finding during system investigation. (4 marks)
c) Give the principal method of data capture in the following applications:
(i.) Banks; (2 marks)
(ii.) Supermarkets; (2 marks)
(iii.) Clothing and footwear retailing. (2 marks)
d) What are the functions of a systems programmer? (4 marks)

(Total: 20 marks)

QUESTION SEVEN

One of the current developments in information technology, which has strategic implications for business firms, is the move towards open systems.

Required:

- a) Explain the meaning of the open systems concept. (8 marks)
b) Discuss the implications of the move towards open systems for organizations that have already invested in proprietary information systems. (8 marks)
c) Outline two potential benefits to information technology due to the move towards open systems. (4 marks)

(Total: 20 marks)

QUESTION EIGHT

Computer systems which process financial data for a company should be audited to evaluate the reliability of information and also the efficiency and effectiveness of the system. The main problem with auditing a computer system is that processing operations are invisible.

Required:

- a) State five systems checks and controls that should be built in the system at the design stage to reduce the problem and weaknesses that auditors frequently detect. (5 marks)
b) Discuss the audit trail in computerized accounting information systems. (6 marks)
c) Explain each of the following computer auditing approaches and techniques:
(i.) Auditing around the computer; (3 marks)
(ii.) Auditing through the computer; (3 marks)
(iii.) Auditing packages. (3 marks)

(Total: 20 marks)

REVISION PAPER 2**QUESTION ONE**

The growth of telecommunications has made information a key organisational resource, which requires careful management.

- a. Give your definition of an Information System. (5 marks)
- b. The management of information may be divided into two categories:-
 - i. Information management and
 - ii. Information Systems management

Give a detailed description of each of these managerial tasks. (10 marks)

- c. It has been suggested that both these managerial tasks commit personnel involved to a 'Lifelong learning process'. What are the reasons for this point of view? (5 marks)

(Total marks 20)

QUESTION TWO

Information systems are usually more to do with people than technology. Over the last century the task of management in organisations has been studied by many academics. Their studies have been categorized under three main headings:- Technical-Rational, Behavioural and Cognitive.

- a. Outline the major aspects of each of these headings; (5 marks for each heading)
- b. List the people involved in developing an information system. (5 marks)

(Total marks 20)

QUESTION THREE

Implementing a new information system, computer or manual, into an existing organisation requires careful planning for it to be successful.

- a. Outline the various organisational (NOT COMPUTER) factors that must be considered and planned for to ensure the probability of a successful implementation; (14 marks)
- b. Outline the relationship between information systems and organisational politics.(6 marks)

(Total marks 20)

QUESTION FOUR

Most data work takes place in an office.

- a. Outline the three major roles of an office. (6 marks)
- b. What is an Office Automation System (OAS)? (2 marks)
- c. Outline what application packages might be found in the accounts office; (4 marks)
- d. Word-processing and desk top publication applications have created a problem of an increased flow of paper. Document imaging systems can reduce this problem.
 - i. Describe the key elements of a document imaging system;
 - ii. Outline why a document imaging system can significantly reduce the paper-flow.

(8 marks)

(Total marks 20)

QUESTION FIVE

Many organizations operate an Information Systems department responsible for providing a wide range of IT related services. Describe the role of the following employees within an Information Systems department.

- a) Project Manager
- b) Systems Analyst
- c) Programmer

d) Data Analyst

(20 marks)

QUESTION SIX

- a. The assurance of quality is an important aspect within all information systems departments. Explain the following two stages of an internal quality assurance process.
- i. Unit testing (7 marks)
 - ii. Systems testing (7 marks)
- b. Explain how using formal specification methods can contribute to improved quality assurance. (6 marks)

QUESTION SEVEN

‘It is one thing to have ownership of your own computer systems but another to accept the responsibilities of ownership such as data integrity, security and overall risk management ‘. This statement was made by a member of the board of a leading company. Explain what the statement means and indicate how the company can ensure that its responsibilities of ownership ‘are properly carried out. (20 marks)

QUESTION EIGHT

A software house produces a software package for the insurance industry. Purchases of the package have formed a very active user group which has lobbied for a particular change to be made to the software to improve the functionality and usability of the software.

Required:

- (a) Briefly explain the following terms:
- (i.) Corrective maintenance; (3 marks)
 - (ii.) Adaptive maintenance; (3 marks)
 - (iii.) Perfective maintenance. (3 marks)
- (b) Briefly explain the meaning and purpose of a user group (3 marks)

The software house has an internal quality assurance process for implementing software changes

Required:

Explain each of the following two stages of an internal quality assurance process:

- (c) Unit testing. (4 marks)
- (d) System testing. (4 marks)

REVISION PAPER 3

QUESTION ONE

In the context of computer-based transaction processing systems: -

- Describe their purpose;
 - Describe two different examples of such systems in differing industries or services;
 - What are the MAJOR security implications of such systems?
 - Describe which of the system development methodologies is most likely to be used, giving reasons for your choice. (5 marks for each heading)
- (Total 20 marks)**

QUESTION TWO

Information systems are the lifeblood of any organization: -

- Describe what is meant by a FORMAL computer-based information system;
 - In parallel with the formal information system, runs an INFORMAL information system. Describe what is meant by this informal information system;
 - Compare this informal information system with the formal system indicating any conflicts that might arise;
 - During the design of a formal computer based information system, should the designers of such a system take into consideration the informal information system, and if so, why? (5 marks for each heading)
- (Total 20 marks)**

QUESTION THREE

To support users of modern networked computer systems, organizations have set up variously named functions such as Help-desks, Information Centres, or Support Centres.

- Describe the major functions of these user support areas. (10 marks)
 - User training and updating is of major importance. Describe what training options are currently available for desktop computer users. (10 marks)
- (Total 20 marks)**

QUESTION FOUR

Executive Support Systems (ESS) are information systems at the strategic level of an organization designed to address the problem of unstructured decision-making through the use of advanced graphics and communications.

- List four types of technological change that have allowed more effective ESS to be developed, indicating how each of these changes contributed to solving the earlier problems of the ESS? (6 marks)
 - In what ways is building executive support systems different from building traditional MIS systems? (6 marks)
 - What are the benefits of ESS? How do they enhance managerial decision making? (8 marks)
- (Total 20 marks)**

QUESTION FIVE

In the conduct of duties, a professional information analyst/programmer might become involved in an ethical conflict with an instruction from his/her organisation. An approach to this problem suggests that there are four main tasks that should be very carefully considered by the professional person before any action is taken: -

-
- a. Collect and examine all the facts of the case;
 - b. Ensure that all internal organisational processes have been utilised;
 - c. Carefully consider your own situation;
 - d. Carefully consider possible final choices and outcomes.

Using the above headings, outline possible tasks and decisions that should be carried out or taken. (5 marks for each heading)

(Total 20 marks)

QUESTION SIX

Strategic benefits for an organization may be obtained by the use of a wide range of text and image telecommunication based applications.

- a. Identify and describe how telecommunication applications can reduce costs and/or help an organisation differentiate products and services. (10 marks)
- b. Describe the factors that must be considered when developing a telecommunications plan. (10 marks)

(Total 20 marks)

QUESTION SEVEN

Businesses and organizations, whether computerised or not, make extensive use of management reporting systems.

- a. Describe some general characteristics of management reporting systems. (8 marks)
- b. A supermarket with some 10,000 stock items must know very quickly when a stock item requires re-ordering. Describe in detail the type of report that should be used, giving details of how the report format should be set up based on an example for a single item, and how the report will be used by purchasing management. (12 marks)

(Total 20 marks)

QUESTION EIGHT

Creating a plan for a new computer system is an extremely difficult task as evidenced by the large number of project failures described in the literature.

Focusing only on the following two key tasks, describe the major features to be considered

by a project manager before embarking on a project: -

- a. Project estimation (10 marks)
- b. Planning techniques. (10 marks)

(Total 20 marks)

REVISION PAPER 4

QUESTION ONE

- a) Describe what is involved in each stage of the systems development life cycle. (10 marks)
- b) Why is it desirable to encourage end-users to participate in the systems development process?
Suggest means of encouraging and ensuring such participation by end users. (10 marks)
- (Total: 20 marks)**

QUESTION TWO

- a) What is the distinction between system verification and validation? Illustrate your answer with an example in each case. (4 marks)
- b) One way of minimizing errors in input data is to use data coding.
(i.) State four characteristics of a good coding system. (4 marks)
(ii.) Describe four commonly used coding systems. (4 marks)
- c) System performance reviews may vary in content from one organization to another but should cover certain key areas. Describe four key areas systems performance reviews should cover. (8 marks)
- (Total: 20 marks)**

QUESTION THREE

- a) You are a consultant to a small business organization that is considering computerising its entire operations. Explain the role of the following generic systems in such an organisation.
(i.) Word processing; (2 marks)
(ii.) Spreadsheets; (2 marks)
(iii.) Database management systems; (2 marks)
- b) Discuss the cost factors that should be taken into consideration in the development, installation and operation of computer systems. (9 marks)
- c) Explain the technique of optical disks as a method of data storage. Give appropriate examples. (5 marks)
- (Total: 20 marks)**

QUESTION FOUR

- a) Define the following terms in relation to systems: (i.) Symbiosis;
(ii.) Synergy; (iii.) Redundancy;
(iv.) Factoring; (8 marks)
- b) What is meant by 'hard' and 'soft' properties of system approach? Describe briefly two features of each. (12 marks)
- (Total: 20 marks)**

QUESTION FIVE

- a) Describe briefly five differences between an expert system and a conventional data processing system. (10 marks)
- b) Outline five factors that determine an application suitability for an expert system approach. (10 marks)

(Total: 20 marks)

QUESTION SIX

A system analyst in the development of computerized information systems is defined as an agent of change.

Required:

- a) Define the term 'agent of change' and describe four roles of a system analyst in the development of computerized information systems.
- b) Outline five advantages of an external system analyst in the development of computerized information systems.

QUESTION SEVEN

Most systems fail due to lack of adequate documentation than any other single reason. Discuss the categories of documentation that may be considered during systems development life cycle (SDLC). (20 marks)

QUESTION EIGHT

A feasibility study attempts to establish whether a project is economically, financially, technically and socially acceptable.

- a)
 - (i) Name two ways in which a new system can realize direct savings. (2 marks)
 - (ii) Name two intangible benefits that can be realized by a new system. (2 marks)
 - (iii) Name two methods of carrying out an investment appraisal. (2 marks)
- b)
 - (i) List three factors to be considered in technical feasibility. (3 marks)
 - (ii) Mention two circumstances under which you would recommend the use of computer bureaux instead of developing a new system. (2 marks)
- c)
 - (i) Name two factors to be considered in social feasibility study. (2 marks)
 - (ii) What is the role of the user during the feasibility study stage? (2 marks)
- d) You have just completed a feasibility study and you are now in the process of writing a feasibility study report. Briefly describe five main sections of your report. (5 marks)

(Total: 20 marks)

REVISION PAPER 5**QUESTION ONE**

Describe the following pairs of terms, stating any similarities or differences between them.

- a) Computer Hardware and Software (5 marks)
- b) Broadband and Baseband transmission (5 marks)
- c) CDROM and Floppy Disk (5 marks)
- d) Microprocessor and ROM (5 marks)

(Total: 20 marks)

QUESTION TWO

Increasingly in systems development, use is being made of CASE tools.

- a. Briefly describe what is a CASE tool. (4 marks)

- b. Additionally, in systems development, the following issues are considered to be important:

-

Producing and maintaining
documentation Adhering to development
standards Maintaining a logical data
dictionary Prototyping

With reference to the above four issues, explain what advantages a CASE tool offers the system developer compared to systems development using manually produced and maintained diagrams, standards and documents. (16 marks)

(Total 20 marks)

QUESTION THREE

- a. A major commercial organization has a policy of developing and using computer-based systems to give it commercial advantage. One consequence of this approach is that new systems need to be, developed on time, within budgeted cost and to quality™.

Describe what quality means in this context. (10 marks) b. It is

often said that the use of structured methods improves the quality of the developed system.

Bearing in mind your understanding of ,quality™, explain how structured methods can contribute towards this and discuss two techniques used in achieving quality.

(10 marks)

(Total 20 marks)

QUESTION FOUR

To enable a user to perform tasks, such as payroll, on a computer special application software has to be purchased.

- a) In addition to the application software list SIX other items that may be included as part of the software package. (3 marks) b) From the six items listed

choose FOUR and explain in depth why they are required. (17 marks)

(Total: 20 marks)

QUESTION FIVE

When data is stored in a computer the term —filell comes straight to mind.

- a) With the use of an example explain the term file. (2 marks) b)

Distinguish between a master file and a transaction (or movement) file and using an example explain the relationship between them. (4 marks) c) List and

explain FIVE factors to be considered in determining how a master file should be organized. (14marks)

(Total: 20 marks)

QUESTION SIX

A major problem facing any organization using extensive computer based information systems is the security of these systems. Security risks can be broadly classified as follows: -

- a. Accidental damage;
- b. Accidental errors;
- c. Dishonesty;
- d. Sabotage and Espionage;
- e. Mischief;
- f. Viruses.

Choose any FOUR of the above aspects, describing the risk and counter-measures that may be taken to protect the integrity of the information system in each case. Use examples to support your answer. (5 marks for each heading)

(Total 20 marks)

QUESTION SEVEN

A Travel company decides that part of its business strategy is to be able to deal directly with its customers by selling holidays over the Internet.

Describe the business and technical issues which would need to be considered in developing the IT and Business functionality that it would need to support this strategy

(a) Business Issues

(10 marks)

(b) Technical Issues

(10 marks)

(Total: 20 marks)

QUESTION EIGHT

How should a Travel company which intends to perform a lot of its business, both with customers and suppliers, over the Internet go about developing its IT security policy and designing its security procedures? **(20 marks)**

ANSWERS**REVISION PAPER 1****QUESTION ONE**

Supermarket use of IS

a. Product ID: The development and agreement on a universal product codes has brought about the wide range of applications for product identification. The associated optical bar code reader in conjunction with bar codes has led to the adoption of this system in many applications, notably supermarkets.

b. POS: - The use of bar codes and optical bar code readers has meant that customers in a supermarket can have the contents of their shopping basket scanned and using the bar code product identification, the local computer can then provide a price and product description which is printed out at the POS position. A bill with totals and sales messages can then be given to the customer for checking purposes. This speeds up the payment process and is more reliable and faster than the check-in person keying in the data. In some supermarkets, an individual bar-code reader is incorporated into a small hand-held computer allowing the customer to carry out the scanning themselves and providing a running total of the goods purchased in a small screen.. This is downloaded at the POS check-out making the process even quicker.

c. Stock Control: - Using the POS system, a running total of stock levels is immediately available, if required, as goods are sold through the POS system reflecting the stock level at a given point in time.

d. Stock Replacement: - As stock levels are obtained on-line, it is possible to make these levels available to a supermarket's warehouse, or a product supplier. Setting minimum and maximum stock levels could automatically trigger orders for replacement products. Often a batch system of overnight replacement is implemented from a supermarket's local warehouse or supplier to reduce logistical costs.

Theoretically, with a known starting stock level, a known through-put of products, the stock level at any instant in time should be available which could be used to place stock replenishment orders. However in practice considerations of breakages, pilfering, errors, sudden changes in weather affecting the sale of certain products, shortage of supply causing panic buying can affect the theoretical system.

QUESTION TWO

Alternative communication systems: -

a. Client-Server: -

A very popular form of distributed processing which splits the required processing between 'clients' and 'servers'. The client is normally the user interface between a user and a desktop computer, workstation or a laptop computer. The user interacts with the user interface to enter or receive data or carry out some form of calculation or analysis of data. The server provides the client with the services required and may be anything from a super computer, mainframe or another desktop computer, usually with a large amount of additional RAM and hard disk capacity.

The subdivision of the processing function and the allocation of storage depends on the requirements of each application. Generally all or the majority of the data storage is in the server whilst the application logic may be split between the server and the client, the precise

division depending on the application and asynchronous data transmission speeds. In some applications more in the client and in other applications more in the server.

b. Internet: -

A world-wide network of interlinked networked computer systems enabling the exchange of information between individuals and organisations on a global scale. Connection to the internet is made through Internet Service Providers (ISP). The internet has no ownership and no formal management organization.

There are number of internet tools for communication such as e-mail, news groups etc. Information retrieval where access to library catalogues, corporations, governments, and non-profit organisation databases is possible. The World Wide Web (WWW) is a universally accepted standard of storing, retrieving, formatting and displaying information using a client-server architecture.

c. Intranet: -

By the use of internet technology, organizations are creating internal networks for use within an organisation on an enterprise basis. Intranets use internet standards of connectivity and software developed for the WWW on the existing organisational network. As a result the networked applications can run on many different kinds of computers in use in the organisation giving greater flexibility of hardware. Intranets are private to the organisation and are protected from the public internet by firewalls which are security systems with specialized software to prevent outsiders from gaining access to the private network.

d. Extranet:-

Extranets are a mixture of internet and intranets whereby an organisation allows outside people or organisations limited access to their own private internal intranets. Extranets are useful in linking an organisation with its customers or business partners allowing them to access such items as stocks levels, products and prices.

QUESTION THREE

Information Systems Security is the safeguarding of the computer system from attacks or destruction. Computer systems are vulnerable due the following reasons.

- a. Destruction/error/abuse/misuse: -
 - i. Hardware failure due to natural causes; electrical failure; etc.
 - ii. Software failure; bugs; poor design etc.
 - iii. Human errors.
 - iv. Theft/corruption of data.
 - v. System penetration by illegal access.
 - vi. Complex computer system difficult to replicate manually.
 - vii. As data is more compact, potential loss is greater.
 - viii. As data is more compact potential damage by abuse/misuse greater.
 - ix. Advent of networks has greatly increased the potential of unauthorised access.
- Paper based systems are less compact and intercommunication is much harder.

b. Risk Assessment: -

Risk can be defined as the product of the amount that may be lost due to a security exposure and the probability or frequency that such a loss will occur. Potential threats may be identified by past experience, use of experts or brainstorming techniques as well as their anticipated frequency (once per month etc.) and potential monetary cost. The controls that might be necessary to counter the threat are also estimated and a judgment made whether the control costs are more or less than the threat and if so should the control procedures be implemented. Controls may be general or application controls.

[General controls are those controls which are not specific in nature. This may include things like authorization of use and the general awareness of the risks by the employees.

Application controls are those controls over the inputs, processing and the output. This may include things such as validation checks and maintenance of data.

c. Worms & Viruses: -

A worm is a program that transfers itself from computer to computer over a network and plants itself as a separate file on the target computer. This program is destructive in nature and may destroy data or utilize tremendous computer and communication resources but does not replicate like viruses.

A worm does not change other programs but can run independently and travel from machines to machines over the network. Worms can also have portions of themselves running on many different machines.

A virus is contagious and is a set of illicit instructions which are passed onto any other programs or documents with which it comes into contact. Viruses are malicious computer programs. Traditional viruses attach themselves to other executable code, infect the user's computer, replicate themselves on the user's hard disk and then damage data, hard disk or files. Viruses attack the following parts of a computer:-

- Executable program files
- File directory systems
- Boot and system areas that start the computer
- Data files

d. Public Key Encryption (PKE): -

Encryption means encoding a message into some form of code so that only the person receiving the message can decode the message. PKE uses two keys, a public key and a private key. The sender uses the public key to encrypt a message which is transmitted over the internet. When the message is received the recipients use their own private key to decode the message.

In encryption the message is converted from the plain text into a secure code called cipher text and cannot be understood before decryption to plain text again.

Encryption key is a piece of information that is used within the encryption algorithm to make encryption or decryption process unique making the user to require a correct key to decipher the meaning.

Encryption algorithm is a mathematically based function or calculation which encrypts or decrypts.

In the PKE the two keys work together as a pair. The public key is known to everyone but the private key is known to an individual thus the only person who can decrypt the message.

QUESTION FOUR

Enterprise systems are business systems. a. Features: -

- Enterprise computing considers the firm as a whole and integrates key business processes into single software systems so that information can flow seamlessly through the enterprise. As a result co-ordination and efficiency of functions should be improved (e.g. sales/stock control/accounts/production/logistics all working from the same data).
- Decision making based on the same information should be improved. An enterprise view is taken of business strategy and processes, technology, and communication networks.
- Are mostly predefined and perform structured tasks e.g. recording cash received and paid out..
- These systems also summarize information for use by the higher management.
- These systems are characterized by high input and output levels and are considered strategic for the survival of the enterprise.

b. Business and technological reasons: -

The global market is highly competitive so organizations must look to methods to improve their business performance. The business reasons for moving are:-

- Need to reduce the operations costs of the business as automation results in reduced costs.
- Need for competitive advantage which comes with the new systems.
- Need to increase market and improve sales through e-commerce which is viable through the new systems.

In parallel the technological reasons for moving include

- Increased processing power which has led to increased output.
- Increased use of client/server and desktop systems which has also given the business a competitive advantage.
- Reduction in data storage costs and elimination of paper work.
- Expanded public communication networks thus enable the business to communicate with their clients easily.
- Complex enterprise software packages are now available which increase the efficiency of operation of the business.

c. Key elements: -

- The ability to integrate key legacy with client/server systems, internet, intranet and various other intercommunication systems is one key element.
- The availability of consultancy services with appropriate experience, custom software developers,
- Local or global communication service providers are all essential elements as well.
- Availability of cash to support the venture.

d. Organisational problems: -

- Enterprise systems require significant organisational change in the ownership of information bringing to the fore personnel problems.
- A change to more complicated technology from traditional legacy systems, large initial costs with difficult decisions on the quantification of long-term benefits.
- Management has to take a long term view when the business world changes like shifting sand, which is very difficult.
- There may be resistance from the employees who may view the change as a chance to lose their jobs.
- Lack of qualified personnel to man the new system could also pose a major problem.

QUESTION FIVE

Ethical issues

a. Professional aspects: - Collins English dictionary definitions of: -

Profession: - is an occupation requiring training in the liberal arts.

Professional: - a person who engages in an activity with great competence.

So a professional person takes on special rights and obligations because of their special claim to knowledge. This implies that such a professional person must keep the ethical standards that pertain to the profession. The following are some of the ethical issues that have to be considered:-

- Keep themselves up-to-date with all aspects of their profession. Each profession has its own ethical code which each individual in the profession has to comply with.
- Any profession requires the practitioner to avoid harm to others.
- The property rights have to be honoured by any professionals. The properties of other individuals have to be respected.
- A professional is required by ethics to respect the privacy of the firm he is working with and that of his fellow professionals or employees.

- He has to follow the Moral Imperatives of their Professional Code of Ethics. Each profession has its own code of ethics.

b. IS ethical dilemmas: -

IS puts so many firms in ethical dilemma as some of their actions go against the ethical standards. Some of the actions which put an organization against ethics are as follows:-

- i. Monitoring individual's e-mail to ensure that it is work related in an organization contravenes individual privacy legislation. This denies the professional right to privacy.
- ii. Using database information for purposes other than what it was set up for without prior consent. This is done by most professionals but it goes against the ethics of the respect of firm's property and its privacy.
- iii. Every effort must be made to ensure the correctness of the data stored in the course of this work the ethical question comes in as illegal methods may be used as long as the data is accurate.
- iv. Illegal copying of software and possible distribution on the WWW. This is unethical as it goes against respect of other people's property.
- v. Respect of Intellectual Property Rights and ownership particularly on the WWW. It may be hard to respect other people's property as with the WWW, it's hard to protect your property.
- vi. Other similar examples will be acceptable

QUESTION SIX

a) Controls that need to be installed:

- Use of appropriate input documents.
- Use of turn-around documents.
- Use of qualified data entry clerks.
- Having computer supervision within the organization.
- Rejection of transactions with errors.
- Use of double-entry/repeated entry method.

b) Methods that would be used for fact finding:

1. Use of questionnaires

A questionnaire is a special document that allows the analyst to ask a number of standard questions set to be asked to a large number of people in order to gather information from them.

2. Interviewing

This is a direct face-to-face conversation between a system analyst (interviewer) and users (interviewees).

3. Observation

This requires the analyst to participate in performing some activities carried out by the user. He may choose to watch them as they perform their activities and gather the intended facts.

4. Record inspection/document review

This method involves perusing through literature documents to gain a better understanding about the existing system e.g. sales orders, job description, etc

5. Sampling

This is the systematic selection of representative elements of a population.

- c) (i) Electronic Funds Transfer (EFT).
- (ii) Electronic funds transfer point of sale system (EFTPOS).
- (iii) Electronic funds transfer point of sale system (EFTPOS).
- d) A systems programmer is one who codes the software in an information system. He performs the following roles:

TECHNOLOGY

- Encodes the procedures detailed by the analyst in a language suitable for the specified computer.
- Liases very closely with the analyst and the user to ensure logical correctness of programs.
- Tests the program to see whether it solves the problems it was intended to solve.

QUESTION SEVEN

- a) Open systems are systems that have been designed according to certain standards that have been set by the ISO (International Standards Organization). The issue of open systems is predominant in hardware area as well as software. The ISO came up with the OSI (Open systems interconnections) model which has seven layers. Each of these layers address certain aspects in the design of equipment once these standards are followed then the resulting system is said to be an open system. The aim of coming up with standards is to allow for compatibility of different equipment which may be from different vendors. Having open systems will therefore be easy to communicate or transmit data from one piece of equipment to another irrespective of the manufacturer.
- b) The move towards open systems brings about a problem to those organizations that had invested heavily in proprietary systems i.e. vendor specific systems. This is due to the fact that these organizations are locked by the supplier and as such the major issue to them is how to move from the proprietary systems without losing their investments in the systems. This issue is also compounded by the fact that there is no way of being able to recognize the systems that are open as such organizations are left to think that the organizations with the term 'open systems' are rarely open.
- c) Potential benefits:
- Open systems enable organizations to buy equipment from many different vendors because they favour interoperability among vendor products.
 - Open systems help to reduce costs due to competition and mass production.
 - Open systems help enhance compatibility of various components i.e. they help facilitate communication.
 - Open systems bring about scalability meaning that organizations can keep on increasing their system's size as need arises.

QUESTION EIGHT

- a) System checks and controls that should be built into the system:
- Input authorization- where particular people are allowed to handle certain information.
 - Batch controls and balancing-which reduces the auditor's work.
 - Data validation and editing facilities.
 - Error identification facilities.
 - A program to keep track of audit trails.

b) Audit trail

Audit trails can be defined as a record of file updating that takes place during a specific transaction. It enables a trace to be kept on all operations on files i.e. audit trail refers to the ability to trace output back to the inputs. The loss of audit trail has an implication in auditing of computer based systems e.g. the auditor will have to be concerned whether the controls within the system have always been operating.

c) (i) Auditing around the computer

Here, one is not concerned about the accuracy only but should be concerned if there is any weakness being abused i.e. check the process being undertaken. In this approach,

the system is assumed to be a black box and the concerned will be whether one given input will give rise to the right outputs. This type of audit does not check for weaknesses in the system as one is only concerned with the correctness of output.

(ii) Auditing through the computer

It involves an examination of processing procedures or routines within the system and also the controls incorporated within the system in order to ensure that the system is capable of providing complete and accurate processing of all data.

(iii) Auditing packages

These are computer programs that can be used for audit purposes to examine the content of business computer files. These audit programs can be: -

- Generalized packages.
- Specific packages- written packages (tailored packages).

Generalized packages

These are programs written by auditors/specialists that can be used in different types of systems. Given that there are general programs, they can therefore be applied in different organizations. This means that these programs can be tailored by designing the format of the files to be interrogated and by specifying the parameters of output data that is required.

Specifically written packages

These are specific software that is written so that they can interrogate or be used in a given organization.

REVISION PAPER 2

QUESTION ONE

a. IS can be defined technically as a set of inter-related components that collect, process, store and retrieve and distribute information to support decision making, coordination and control in an organization.

b. Two types of manager required: -

i. The Information manager is responsible for the process of identifying, defining, acquiring, storing, processing, protecting and distributing both data and information.

ii. The Information Systems manager must understand individual managers' information needs, the value of the information that is required, and must be able to design and provide the appropriate supporting information, communications and technological system the organization requires.

c. Lifelong learning:- As organizations change very quickly, so do their information needs. At the same time the range of computer H/W, S/W and communication techniques changes just as rapidly. To cope with these moving sands of organization and technology, requires a good knowledge of existing tools and techniques, awareness of future developments, an open mind to change and an ability to be a flexible and creative problem solver.

QUESTION TWO

Outline of Technical-Rational, Behavioural and Cognitive management theories. **a. Outlines**

i. Technical-Rational:-

The organization is perceived as a closed system in which the efficiency and effectiveness depend on the precision of operation, the creative design and integration of the individual parts. The managerial role is to plan, measure, control, organize, co-ordinate the parts such as machinery, operators, jobs and tasks so that they function as efficiently as possible. This perspective can have two variants, the scientific school which focuses on the factory floor and the administrative-bureaucratic which focuses on the office administration.

ii. Behavioural:-

Appeared after the technical-rational perspective and considers people who work in an organization not being automata. It considers the role of small groups, their norms and working environment. Considers the organization as an open system and the efficiency and effectiveness depends on how the group continually adapts to its environment and its ability to rearrange itself internally so that it can 'fit' the current environment in which it operates. Here again there are two variants, one which focuses on the psychological and social-psychological needs of the employees and the other focusing on the organization and its structure and its ability to adapt to the rapidly changing environment in which it operates.

iii. Cognitive:-

This is concerned with the ability of an organization to 'know' and 'learn' from its own environment and from the environment in which it operates. The organization's efficiency and effectiveness depend on its ability to gather, create, store, classify, disseminate and use information and knowledge that it accumulates over time. The managerial role is to make sense of the latent information and knowledge available to them together with their own intuition and experience, to perceive problems and design solutions and to build an information and knowledge processing infrastructure for the organization.

b. People involved in the development of an information system:

- User
- Systems analyst- to provide system requirements.
- Programmers- to code software.
- Project manager- He is in charge of the project.
- Senior organizational management- they approve and take part in reviewing the development effort.
- Experts in various fields to provide views needed in the feasibility study.
- Software and hardware maintenance vendors to provide maintenance and support (if it is not carried out by the organization).

QUESTION THREE

Implementing a new information system

a. Non-computer organisational factors to consider

The implementation of a computer system is likely to affect an organization in a number of ways:-

- Organisational structure change;
- Will the past history and culture of the organization be affected;
- External environment factors such as the use of computers at home; Possible change in organisational levels, currently flatter;
- Significant changes in the current tasks and the decisions that are taken;
- Are management supportive of the changes that will occur as a result of the new system;
- Age, skills, computer literacy of the workforce involved. As we question ourselves. The above factors are to be considered.

b. Relationship between information systems and organisational politics

Information systems can determine what information, its content, its timing and action required within an organization, leaving little latitude for individual discretion. By so doing IS helps to determine the access of specific subgroups and interests in the organization to information which is a key resource. Thus the balance of political power that already exists may change causing unrest in the organization.

QUESTION FOUR**Office systems****a. Major roles of an office are: -**

- The collection, distribution and coordination of work within the organization across levels and functions;
- The collection, distribution and coordination of work from the organization's external environment;
- The coordination of the work of local professional, managers, sales and clerical workers.

c. OAS can be defined as any application of information technology that intends to increase the productivity of information workers in the office.**d. Typical applications packages in the accounts office are:-**

- Accounting,
- Spread-sheet
- Word processing.

d. WP/Imaging systems

i. Elements of document imaging systems are scanners, powerful computer, bulk optical storage systems (jukeboxes), index servers for document retrieval, retrieval equipment

consisting primarily of workstations with graphics capabilities and printers, all connected by LANS.

ii. Imaging systems can reduce document flow by allowing more than one person to work on a document via workstations. Previously with paper-based systems, work was carried on sequentially on a document. With the availability of LANS, retrieval systems and workstations, processing can be done in parallel thus reducing the total document processing time.

QUESTION FIVE

a) Project manager

Much of the work that takes place in an Information Systems Departments relatively unique and non-repetitive. For example, organizations developing a major application will probably only undertake such a task at most every five years. These one off developments are usually organized as projects where a team is brought together to undertake the work and is disbanded when the work is completed. A designated project manager has ultimate responsibility for the planning, development and delivery of the products produced in the project. The project manager manages the team that has been brought together to undertake the project, allocating work, monitoring and reporting the progress of that work as well as motivating members of the team. It is the project manager who usually develops and maintains the project plan and who identifies slippage against that plan and takes appropriate action.

b) Systems Analyst

Most information systems projects deliver software that automates organisational processes. The successful development of these software solutions partly depends upon building a correct understanding of how business processes currently work and how the user wants them to work in the future. Understanding and documenting current systems and defining the requirements of their successors is the task of the systems analyst. He/she usually undertakes a series of interviews with the user to determine how they currently work and how they wish to work in future. From such fact finding the analyst formalizes these requirements in a document called the Requirements Specification where the required processes and performance of the proposed system are described in both graphical models and textual models.

c) Programmer

The Requirements Specification produced by the Systems Analyst is further refined into a design specification which shows how the organisational requirements specified by the user will be delivered by the computer based solution. Part of this design will be the detailed specification of processes. This detailed specification will be passed to the programmer who has responsibility for writing the program code to implement the processes. This code has to be functionally correct as well as adhering to agreed standards of program design and syntax. The program is usually subjected to a formal structured walkthrough where the program is checked for correctness and adherence to organisational standards. It is the responsibility of the programmer to perform a series of unit tests before releasing the program into the wider system.

d) Data Analyst

The process specifications described in the previous sections are only part of the design specification. Another important part of the design is the data specification usually consisting of a graphical entity relationship model supported by tables describing the content of each entry. Data Analysts often perform the production of this data specification and indeed they may be involved in earlier specification work, providing specialized assistance to the system analyst. In any structure data analysts will report to a data base administrator suggesting that they may also undertake the

design of files and databases, producing a robust and efficient database design to support the business processes specified in requirements analysis.

QUESTION SIX

a.) Unit testing

Programmers usually perform unit testing. Programmers receive specifications from systems designers and develop programs to meet these requirements. Once they are sufficiently confident about their programs they undertake a set of formal tests. These are usually designed to:-

- Ensure that every line of the program has been executed and is working properly
- Ensure that data stored by the program is accurately placed in the correct files in the database
- Ensure that interactions with other programs are working correctly
- Ensure that error conditions are handled correctly

Unit testing is performed explicitly on the program code and structure. It is often termed white box testing because it is concerned with inspecting the internal logic of the program.

System testing

The analysts who have developed the functional specifications and specified the design of the system usually perform system testing. System testing is often termed black box testing because the testing is concerned with proving that certain inputs produce predicted outputs. It is not concerned with proving the internal logic of the programs that cause the transformation to take place. This has already been done in unit testing. Hence system testing is concerned with ensuring that the system meets the functional requirements defined in the requirements specification. It also considers the general usability of the software. In some organizations system testing includes load or stress testing which tests the system under operational conditions, ensuring it can still deliver the required performance when handling operations volumes by the agreed number of users.

b) Most formal specification methods have defined methods and rules of construction. For example in a DFD it is not acceptable to directly link a data store to another data store or an external entity with a data store. Adherence to the rules of construction can be checked in structured walkthroughs and this assists the quality assurance of the product. It does not assure that the product is functionally correct, but it does ensure that the product is constructed to the required standard.

Graphical models open up the design process to user scrutiny. This will help to ensure that the system is doing the right things as well as doing them right.

QUESTION SEVEN

Privacy issues associated with sensitive data held on a computer system is an obviously important consideration. The statement highlights three important aspects.

1.) Data integrity is the term used to describe the accuracy and correctness of data during and after processing. Systems controls are designed into a system as procedures to maintain the integrity of the data and are incorporated at all stages in the system's operation. Typically systems controls perform the following functions:-

- o Recognizing when problems occur
- o Finding and eliminating errors
- o Ensuring that all data is processed
- o Maintaining the correct timing and
- o Sequencing of input and output processing
- o Restarting the system efficiently when a breakdown occurs or when data files have been corrupted providing a record of all processing operations

2.) The security of information relates to all aspects of protecting information from unauthorized access, sabotage, accidental loss or damage, fraud and physical damage.

Systems security seeks to provide protection against the following:-

- The security risk of unauthorized users gaining access to the system
- The accidental loss of data stored on computer files-for example due to operator error or updating the file.
- The deliberate sabotaging of the system
- The risk of physical damage to computer files caused by dirt, water, fire damage and explosion

3.) Managing the risk associated with computer security essentially involves reducing the risk profile of the company to the lowest feasible level. Risk management involves three stages:-

- Risk assessment - arises from a full examination of all security factors. It should be noted that risk is specific to an organization at a point of time and will change as applications are changed, new hardware introduced etc.
- Risk minimization - is the action the organization takes when it has identified its exposure to risk and is the most critical aspect of the exercise. The process is often termed computer security and will cover a multitude of aspects such as the provision of standby facilities and disaster recovery procedures.
- Risk Transference - recognizes that it is impossible to eliminate all risk however effective the security is. The uncovered elements of risk can be transferred through the medium of insurance to an insurer of data

QUESTION EIGHT

(a) (i) Corrective maintenance

Corrective maintenance addresses two sets of faults. Firstly, the correction of programming errors which have caused the software to fail. Secondly, the correction of system functions that do not perform to the agreed user specification. Hence corrective maintenance is concerned with making the software perform as it should have done in the first place. It should lead to a robust system that supports the user requirements signed off at the start of the project.

(ii) Adaptive maintenance

Adaptive maintenance is concerned with changes required to make the software support new or changed business circumstances. These changes will emerge throughout the project as a result of changes in the business process, changes in the priorities of users and external influences such as new government legislation. Adaptive maintenance is concerned with making sure that the software continues to robustly support the user requirements during the lifetime of the system.

For example, the User Group may request adaptive maintenance to improve the functionality of the software.

(iii) Perfective maintenance

Perfective maintenance attempts to make the software perform more effectively. These changes may include alterations in the user interface (to make the system easier to use) and the integration of new program sub-routines (to make the software run quicker). Perfective maintenance does not change the functionality of the software, but it should make that functionality more accessible and efficient. For example, the User Group requires perfective maintenance to improve the usability of the software.

- (b) There is a tradition of individual users of software products banding together to exchange information and experience of using a particular package. In many instances this is translated into a formal User Group which acts as a forum for exchanging information and experience between members as well as forming a focus for lobbying the software developer to develop new features and correct current problems. In many

instances the activities of the User Group are encouraged and financed by the software developer as it provides a convenient and coherent focus for defining the features that will further enhance their product. Most User Groups issue newsletters and hold regular conferences, which allow new and prospective users of the software to evaluate the software developer and the products it offers.

(c) Unit testing

Programmers usually perform unit testing. Programmers receive specifications from systems designers and develop programs to meet these requirements. Once they are sufficiently confident about their programs, they undertake a set of formal tests. These are usually designed to:

- Ensure that every line of the program has been executed and is working properly
- Ensure that data stored by the program is accurately placed in the correct field in the database
- Ensure that interactions with other programs are working correctly
- Ensure that error conditions are handled correctly

Unit testing is performed explicitly on the program code and structure. It is often termed white box testing because it is concerned with inspecting the internal logic of the program.

(d) System testing

The analysts who have developed the functional specification and specified the design of the system usually perform system testing. System testing is often termed black box testing because the testing is concerned with proving that certain inputs produce predicted outputs. It is not concerned with proving the internal logic of the programs that cause that transformation to take place. This has already been done in unit testing. Hence system testing is concerned with ensuring that the system meets the functional requirements defined in the requirements specification. It also considers the general usability of the software, perhaps against agreed Style Guides. In some organizations, system testing includes load or stress testing which tests the system under operational conditions, ensuring that it can still deliver the required performance when handling operational volumes by the agreed number of users.

REVISION PAPER 3

QUESTION ONE

- a) A transaction is a basic activity conducted at the Operational level of any organization. A computer based transaction processing system (TPS), processes and records the daily routine transactions that any organization must carry out. The criteria and processes are clearly defined, and highly structured. TPS may be operated under batch or on-line conditions.
- b) One example of a TPS is a point of sale system (POS) used in supermarkets and other retail stores. This system is used to process sales at the supermarket counters. The inputs for such a system are the type of good and its price. This data is usually encoded in a bar code that is attached on the commodity and swiped past the bar code reader at the POS in order to capture the data. The processing consists of calculating the amount that is due from the customer and also the change that is to be given to the customer once the customer has given money for the commodities. The storage in the system is in the form of a database of files. The records in the files usually describe the commodities on the counter e.g. their name, type, number of units, reorder level, expiration date, etc. The database is updated after each transaction. The output from the POS is a receipt containing details of the purchase of goods by the customer such as the goods purchased, their unit cost, the total cost of the purchase, VAT charged, etc.

Another example of a TPS is a flight reservation system. This system is used to book flights of different airlines according to the preferences supplied by the client wishing to travel. Inputs for such a system include the date of travel, the time and the preferred airline. The processing consists of checking whether the client preferences can be satisfied and returning a response to the client which will prompt him either to supply different preferences or proceed with the booking by paying. The processing also consists of updating the database of records with the details of a client's payment. The storage consists of a database containing records of each airline such as the number of flights made in a week, the schedule of the flights, the costs of each flight, etc. The output of such a system is a receipt containing details of the booking.

Other examples of TPSs could include systems in Manufacturing, personnel, academic registration, holiday booking, etc

- c) Security implications of transaction processing systems:
- There have to be controls to prevent data capture with errors e.g. repeated data entry
 - There have to be controls to ensure that processing is not interrupted for whatever reason e.g. Uninterruptible power supplies could be installed to protect the processing from being interrupted by power loss.
 - Storage and backup have to be secured from threats to data security e.g. fires, unauthorized access, etc
 - Adequate controls in the database have to be put in place to counter security threats, the threat of lost updates, etc
- d) As the TPS is crucial to an organization, great care in its design and implementation is essential. Methodologies such as SDLC, SSADM and their variants, with the possible use of prototyping to clearly define the users requirements in their initial stages, are possible candidates for the design and implementation of a TPS. A methodology with rigour and good documentation is required for this system which serves as the foundation to many other INFORMATION COMMUNICATION TECHNOLOGY.

QUESTION TWO

Formal/Informal Information systems

- a) FORMAL information systems conform to relatively fixed predefined rules and procedures for processing, storing, accessing and distributing data. They need not necessarily be computer based, but the sheer volume and speed requirements may make the use of computers essential. As computer hardware and telecommunication technologies coupled with software complexity become part of the everyday life of an organization, so more informal information systems become more formal. For example the use of intranets.
 - b) INFORMAL information systems are the normal human group networks which operate at and between all levels of an organisation. Within the office, at coffee/tea breaks, between union members within and without the organisation etc. There is no formality on what is information, how it will be stored or processed or how it will be used. It is the lifeblood of any organisation.
 - c) Often informal information flows through the internal personal networks, or maybe through external personal networks, are faster than the formal system since there are no specific procedures for information flow. Rumour or gossip may add to the data as it passes through the informal networks with sometimes damaging results, e.g. walkouts or strikes by the labour force.
 - d) The design of an information system, whether manual or computerised, must take into consideration the appropriate format of the messages that are to be transmitted, to whom they are addressed, and the speed at which the message is to be transmitted.
- With the use of email systems within the organisation, data protection rules and regulations must now be considered following recent legal proceedings.

QUESTION THREE

a) **Typical services are: -**

i. Hardware and software selection;

- Identify new and current hardware & software that will meet users current and future requirements.
- Provide updates as appropriate.

ii. Network administration;

- Help on use of networks e.g. help on how to share files over the network or how to access shared files on a server.
- Administration of passwords and authorisation.
- Security aspects e.g. Backup of data, advising on secure use of passwords, etc
- Update of security software e.g. updating antivirus

iii. Technical Assistance;

- Advice on company standards for hardware and software purchases.
- Setting up hardware, software and networks.
- Some systems analysis and design- involves determining whether the organizational information processing and communication requirements are being met effectively and designing of systems to meet these requirements.

b) **Training options;**

Onsite training

This option involves training the employees at the organization's premises specifically at the workstations where the employees carry out their work. It has problems with attendance as employees may be under pressure at their workstations. Often short one or two day training on new software is not very productive as there is a great deal of information to assimilate in a short period of time. Experimentation takes time and is necessary for the understanding of standard and short-cut computer operations.

Off-site training

This option involves training the users at a location away from their workstation. It removes the attendance problem but may cause problems with the workflow since the employees will be overburdened with the training and their duties. It is more conducive to immersion in the training processes whereby the employee concentration is of absolute importance e.g. training on security procedures e.g. backing up of data.

Use of on-line training packages.

This training option is carried out through the use of the Internet or intranet. Employees access web pages that contain the training material on a server. Often no time is allocated and trainees have to work through the programme in their own time. If user is motivated then a reasonable option but better if time allocated during normal working hours and an element of supervision/help is available. The Help Desk is often valuable in this type of training.

QUESTION FOUR

- a) Technological changes that allowed the development of more effective ESS include: -
- i. Networks developed allow data to be gathered together from various computers and locations.
 - ii. New approaches to storing and accessing data made the sharing of data on desktops a reality.
 - iii. Desktop computers and work stations having enough power to be able to analyse data rapidly and in graphic format.
 - iv. New interfaces such as the mouse, graphic user interfaces and touch screens and Help facilities have made systems use more intuitive without the need for technical computing education.
- b) Building an ESS is different in a number of ways from building traditional MIS. ESS as are built through prototyping rather than traditional structured methods because executives needs change so rapidly. Once the executive user is involved, development must be very rapid to satisfy him/her, far more so than with an MIS systems. Finally, at first ESS will be given far greater support per executive user than with traditional MIS systems in order to be able to iron out wrinkles rapidly enough to prevent failure of the project.
- c. Benefits of the ESS are not easily measured. However the following is a suggested list:
- i. ESS flexibility allows executives to shape the problems as they need, using the system as an extension of their own thinking.
 - ii. ESS offer the executive the ability to analyze, compare, and highlight trends freeing up the executive, for more creative decision making.
 - iii. ESS allows the —sharing of mental modelsll between executives in planning/brain-storming meetings in a highly graphical way.

QUESTION FIVE

Ethical conflict

- a) Examine the facts: -
- i. Can the practice be clearly identified as illegal, potentially dangerous or just a questionable business practice?
 - ii. What damage will be caused to all stakeholders in the organisation weighed against what is likely to be achieved.
 - iii. Know the organisational ethical standards and laws and regulations relating to the abuse.
 - iv. Document and verify all research clearly and carefully
- b) Internal processes carried out: -
- i. Identify organisational policies and procedures which may support correcting the abuse.

- ii. Always support your complaint in writing with supporting documentation and deliver to the correct authority.
 - iii. Make sure ALL internal channels available have been covered.
 - iv. Make sure ALL processes have been fully documented.
 - v. Allow a reasonable time for the organisation to remedy the situation, carefully noting actions taken and time occurring.
- c) Own situation: -
- i. Establish support for your action with your colleagues.
 - ii. Consider your own employment record carefully, as it is possible that the organisation might try to discredit your action.
 - iii. Be quite clear on your own legal rights.
 - iv. Be firm but reasonable with your claim.
- d) Possible choices and outcomes: -
- i. Once all the internal channels have been exhausted then you face the following options: -
 - (1) Leave the organisation and report the abuse;
 - (2) Stay and expose the abuse;
 - (3) Stay and say nothing.
 - ii. Report the abuse to a statutory regulatory body.
 - iii. Go to the media, pressure group, and your parliamentary representative.
 - iv. Most importantly, **always Document Times and Dates of Everything Concerning the Abuse.**

QUESTION SIX .

Telecommunications applications that can provide strategic benefits to businesses include: -
World Wide Web/Electronic mail:

The World Wide Web (WWW) is a system with universally accepted standards for storing, retrieving, formatting, and displaying information in a networked environment. Electronic mail is the computer-to-computer exchange of messages. WWW and e-mail use both intranet (a private network based on internet technology), and the Internet (a network of networks that is a collection of thousands of private and public networks). Many organisations now use the intranet to connect to their dealers throughout the world. Others use the WWW to post their procedure manuals to keep geographically distant locations up to date. Business benefits include up to date price lists and product information for dealers.

Facsimile (FAX):

This is the transmission of documents containing both text and graphics over ordinary telephone lines using a scanner that digitises the document. This has business benefits in a allowing the cost-effective, speedy transmission of complex documents including drawings and signatures. Faxed documents are accepted as legal documents.

Video conferencing:

Improves communications by allowing design teams to confer simultaneously through electronic mail or Group communication software. This allows faster time to market cycle times in design teams and thus contributes towards differentiation and competitive advantage.

Can reduce the need for expensive travel by individuals or teams, but face-to-face contact is still very important for certain situations.

Electronic Data Interchange (EDI):

This is the direct computer-to-computer exchange between two organisations of standard business transactions documents. This is now becoming a normal strategic tool in supermarket retailing logistics management. The ability to minimise inventory, and improve logistics planning using EDI contributes to cost reduction, and also improves the quality of perishable inventories held.

b. Major components of a telecommunications plan are:

- i. Assessment of existing telecommunications functions, their capabilities, limitations and risk exposures.
- ii. Knowledge of the firm's strategic business plan and contribution that can be made by telecommunications.
- iii. Knowledge of how telecommunications supports the firm's daily operations, with identification of critical areas where telecommunications affects performance.
- iv. Specific network requirements need to be addressed by the plan concerning;
 - o Distance & Security
 - o Range of services to be supported
 - o Access (e.g. multiple access by many casual users or high intensity usage by dedicated smaller group of users)
 - o Utilisation Costs of operation
 - o Connectivity issues.

QUESTION SEVEN

a) Management Reporting Systems characteristics: -

- i. Provide the feedback path in the target/budget versus actual results systems enabling management control on appropriate organizational key issues.
- ii. May cover long medium or short time periods depending on the level of management using the reports.
- iii. Are oriented towards the past or present time.
- iv. They summarize or classify key data and present the information in standard formats either on screen or paper printouts.
- v. Sources of data must be consistent over time to ensure like is compared with like.
- vi. Are stable over a significant time period.

b) The report required in this example would be an Exception report. Due to the high number of stock items, it would be an impossible task for any manager or clerk involved in re-ordering individual stock items to keep track of the situation. For each item that is required to be carefully controlled, so that it does not run out of stock, would be the establishment of minimum and maximum stock levels together with a reorder level. Often a further set of warning levels for minimum and maximum levels would be set. Delivery times must also be factored into the reorder level. The exception reporting system would only report on a given item of stock if any of these levels were crossed. If the stock item was 'in control', that is between the set levels, no report would be made. With exception reporting, only items that are going, or are outside the various levels set for that item would be reported. This means that action is required in some form for any item that appears on the exception report.

QUESTION EIGHT

Planning factors for consideration in Estimation and planning techniques: -

a. Estimation

i. **Complexity:**

Intuitively the more complex the longer time it will take to produce a product, usually software in this case. Various metrics have been produced but they still rely on estimates themselves. These measures have been found to correlate with the number of source statements in the product produced. Increasing complexity requires more effort and higher fault rates.

ii. **Skill of team members:**

This has a major influence on the effectiveness of effort applied. Studies in this area indicate a 1: 7 ratio between best and worst programmers. High-achievement environments also appear to have an effect probably because they attract more high achievers.

iii. Elapsed time of project:

The longer the project takes to deliver its final results, the more likely it is that the environment or business conditions will have changed during the lifecycle. This leads to ever changing objectives, requirements and constraints requiring replanning, respecification, redesign, redevelopment retesting etc., and disaster. Short projects do not, in general, suffer these problems. Deliver large projects in suitable chunks if at all possible.

iv. Staff turnover:

Loss of key staff can significantly affect project schedules and costs as experience leaves a team. Also there is an effect on existing team members. New staff require time to cover a learning process.

v. New methodologies/technology:

Have to be learnt and experienced by team members which takes time and should be tested on short projects to gain that experience. Management and utilization of the new methods and technology is also an important consideration.

vi. Size of team:

Larger teams require better intercommunication skills. Tasks are not necessarily easily divisible and resources can display great variations in productivity (see ii above).

b. Planning techniques:**i. Work breakdown structures:**

Creation of an initial simple list of major activities and their estimated durations. These major activities can then be broken down to form a more detailed Work Breakdown Structure (WBS) giving a better understanding of how this level of detail will be accomplished.

This WBS still does not show when activities will commence and finish and if certain activities can be carried out in parallel.

ii. Gantt and Milestone Charts:

Gantt charts are a series of horizontal bars drawn to represent activities whose length is proportional to the activity duration. They are simple and effective and show time along the horizontal axis with vertical bars that depict tasks or activities and indicate their estimated start and finish times. Milestone charts are similar but do not show start and duration but only the planned completion dates of events. Gantt charts do not show the dependencies of one or more activities on other activities.

iii. Networks:

They allow the portrayal of the dependencies between tasks graphically, utilizing a network of nodes and lines. There are a variety of notations that can be used such as activities -on-arrow or activities-on-node. Critical path Analysis uses a network to establish those activities which are critical to the early delivery of the final product. This enables project managers an important tool for identification of critical tasks. The use of project planning software is important to monitor the ever-changing project progress. Project Evaluation and Review Technique (PERT) was developed using a statistical duration estimation technique for tasks which was the major contribution of the PERT approach.

REVISION PAPER 4

QUESTION ONE

a) System development life cycle is also known as traditional system development method or function driven method or process driven method. This method requires the analyst to follow a sequence of phases during the development and implementation of an information system. This involves people and is described as information system development project. The following stages are followed:

1. Preliminary study

This stage involves determining whether there is need to change the existing system. It may require management requests for change of the existing system to give the firm a competitive advantage or to improve staff morale. The user department has to be involved in the definition of the problem. The objectives of the preliminary study are to understand the existing system and determine whether change is desirable. A document titled terms of reference is prepared by the steering committee. It acts as a reference document throughout the system development process. The contents of the document among other things include project title, subject of study, purpose of study, personnel departments affected, available resources and the project's estimated duration and schedule.

2. Feasibility study

It involves a detailed study by the feasibility study team. Its purpose is to define the problem and decide whether or not a new system to replace the existing one is viable. Here, the analyst assesses the magnitude of the problem and attempts to restrict or at least identify the scope of the project. He/she must identify alternative solutions to the problems and recommend the most effective solution. Feasibility study objectives include:

- Identification of main characteristics of the existing system.
- Determination of the main output requirements.
- Consideration of alternative ways of meeting similar requirements.
- Preparation of gross estimates of developments, implementation and operation costs for each probable alternative solution.
- Documentation of the study.
- Preparation of gross estimates of possible direct and indirect benefits for each probable alternative.

The areas of feasibility study are:

(i.) Technical feasibility

This basically involves the equipment and software e.g. whether the available hardware is adequate and purchase is to be made. Basically it involves evaluating:

- The hardware required for the new system.
- The software required for the new system.
- Whether the current technology supports the systems.

(ii.) Social feasibility

It deals with the effect of the system on the current society within the company. It involves evaluation of:

- Reaction of individuals inside and outside the company to the system.
- Effect of the system on the existing organizational structure.
- Redundancy or retrenchment.

- The effect on the current working practises and management level.

(iii.) Legal feasibility

Here the new legal implications should be evaluated e.g. if it requires that the computer to be insured or whether the stored data should be registered with the government registrar before use. Generally, any legal aspects associated with the new system should be assessed, and adequate measures taken to protect the interests of the user company.

(iv.) Economic feasibility

This involves the determination of whether or not to continue with the project, depending on whether the project is economically viable. The benefits and implementing costs of the project are to be determined to confirm the profitability of the project. A cost-benefit analysis is carried out to determine whether the new system is economically viable.

At the end of the feasibility study, a feasibility study report is prepared which recommends whether further funds are to be committed to the project.

3. Fact finding/investigation

This involves collection of information about existing systems on which to base analysis in order to determine whether users' current needs are being met. Fact finding involves the following activities:

- Fact-gathering.
- Fact-recording.

The fact finding techniques involved are:

- Use of questionnaires.
- Interviewing.
- Observation.
- Document review.
- Sampling.

4. Analysis

Systems analysis involves evaluation of the current system using the gathered facts or information. Analysis involves detailed assessment of the components of the existing system and the requirements of the system. Activities carried out are:

- Analysis of the organization environment.
- Analysis of the present system.
- Requirements analysis.

At the end of the analysis a document called the statement of requirements is produced which gives light whether or not to proceed to the next stage.

5. System design

System design involves the analyst deriving a logical model of the way the existing system works. The aim of design is to arrive at a detailed statement of how the system is to be made operational. It involves the logical design, which produces specifications of major features of the new system, and physical design that involves program specification, physical files and the user interface. This stage ensures the actual design of the system. It includes the input-output design, screen design, interface design, program design and the system specification. The document prepared at this stage represents the conceptual system or logical system.

6. System development

This involves programming, testing and documentation activities.

Programming

It involves translating of the system specification into program code. The user requirements are integrated into a computer system. A program specification is prepared which is useful in the implementation of the program.

Testing

The programs are tested before system conversion takes place in order to check for errors and their workability. The program is tested for errors and its acceptability to the management and users. A structured walkthrough (review of development) is also done at this stage.

Documentation

This involves preparing of manuals, books, description and diagrams relating to the use and operation of produced software.

7. System implementation

This phase is concerned with putting the system's designs into practice. It involves the following activities:

- Hardware selection, acquisition and installation.
- User training.
- File conversion/creation.
- Change over.

8. Review and maintenance

This is basically done once the system is implemented and is in full operation. It is done to see if it has met the objectives set out in the original specification. Corrective measures are taken at this stage. From time to time, the requirements of the company change and thus the system has to be examined to see whether it can cope.

b) End users are encouraged to participate in the systems development process due to the following reasons:

- The system being developed is tailored to meet specific users needs i.e. their business priorities and information needs.
- It increases user's understanding and acceptance of the system, reducing problems caused by power transfers, inter-group conflict, and unfamiliarity with the new system.
- It also reduces training costs at the end of the program development as users are retrained as the program is developed.
- Involves improved security of the system as areas likely to be affected are identified early in the development process.

The end users can be encouraged to participate in the process through the following means:

- Through education i.e. by educating them on the importance of their involvement.
- Through registration and agreement.
- Provision of incentives i.e. being paid for the time they are involved in the project.
- By counselling the employees.
- By explicit and implicit coercion i.e. where the employees are adamant.

QUESTION TWO

a) Verification

This refers to the process of checking that data has been correctly transcribed. It involves comparing a second transcription with a first. An example is the process of checking password changes.

Validation

This is an attempt to build into the computer program powers of judgement so that incorrect items of data are detected and reported. An example is before inputting data in a computer; checks are run to prevent any error from being carried forward.

b) (i) Characteristics of a good coding

- system:**
- It must be brief.
 - It must be unambiguous/distinct.
 - It must have capacity to expand/growth.
 - It must be simple and easy to remember.
 - It should not be bulky.
 - Should be unique.

(ii) Commonly used coding

- systems:**
- Serial coding.
 - Block/group coding.
 - Faceted coding.
 - Mnemonic coding.
 - Hierarchical coding.

c) Areas that performance reviews should cover:

- The staffing needs and whether they are more or less anticipated.
- Any delays in the processing and effects of such delays.
- Effectiveness of the inbuilt security procedures in the system.
- The error rates for input data.
- The output i.e. whether it is current, timely and distributed correctly to the relevant users.
- Comparison of the actual system performance against the anticipated performance.

QUESTION THREE

a) (i) Word processing

They are special purpose packages used for the production of documents such as letters and contracts.

(ii) Spreadsheets

These are computer packages that deal with computations involving inter-related rows and columns of data. They perform calculations on the value displayed in the rows and columns. They also have facilities such as pie charts and bar charts that can be used in information analysis.

(iii) Database management systems

This refers to a set of software or programs that provide the interface between the logical and the physical data i.e. it manages the database. It is relevant to the decision support system in that it handles the interpretation and the processing of the statements which are commanded in the query language. In addition, it facilitates the retrieval of the required data from the data files in a manner which the user specifies and which in *****

- b) Costs and expenses which are incurred by a system. These costs include equipment costs, development costs, operation costs and software costs. During analysis, one should consider the cost of the proposed and existing system. These costs fall under the following categories:

(i) The cost of running the existing system

These are basically calculated from past records and include:

- **Manpower costs**-they are extracted from manpower and payroll reports.
- **Material costs**- which includes consumerables like stock.
- **Operational costs**- e.g. equipment costs and replacement costs.
- **Overhead costs**- direct expenses incurred by the company on behalf of all departments.
- **The intangible cost of the existing systems** e.g. loss of sales

(ii) The cost of operating the new system

This will include all the areas covered above i.e. manpower, materials, overheads and intangible costs. However there are additional costs associated with computer system, insurance of the computer system, cost of data transmission, cost of consumerables like print cartridges, ribbons, etc. All these costs should be evaluated as accurately as possible.

(iii) The cost of new system development

This will include the cost incurred for any consultancy services that may have been hired during development. Allowances to the system development team fall under this category. The overall effects of the systems development and implementation should be determined and any cost associated established. Staff training costs, recruitment costs and retrenchment costs should also be considered under system development costs. These costs are based on time and activities involved in the project.

c) Optical disks

They store bits as —pits and —lands on the surface of the disk that can be detected (read) by a laser beam. They use laser technology to store massive quantity of data in a highly compact form. There are several types:

- **CD-ROM (compact disk read only memory)**- only read and cannot be erased for re-writing. Has a capacity of 650 MB.
- **CD-R (compact disk recordable/WORM (write once read many))**- usually blank at first and can be written only once. Has a capacity of 650 MB.
- **CD-RW (compact disk rewritable)**- can be written and read more than once. Its capacity is 650 MB.
- **DVD-ROM (Digital Video Disk)**- they are similar to CDs except that it has high quality sound and high-resolution video. It has a capacity of between 4.7 GB and up to 17 GB.

QUESTION FOUR

a) (i) Symbiosis

A system is made up of subsystems. Symbiosis is a state where two systems operate as one and if one ceases to exist, the other cannot function. This implies that there exists a give and take type of relationship within the system. An example is where there is an integrated sales and purchases system where if one system fails, then the system is brought to a standstill.

(ii) Synergy

It's also known as holism. It states that in any system, it is possible to attain more than if each of the subsystem worked individually. Synergy states that —any whole is more than the sum of its individual parts.

(iii) Redundancy

A redundant component within a system is said to exist if that component fails and the system is still able to attain its objectives. Redundancy is said to occur when the whole

system continues to operate and attain its objectives even if one subsystem has ceased to exist.

(iv) Factoring

This is the process of disintegrating a system into sub-system units. A large system can be factored into subsystems to improve its performance. An example of factoring is in a business organization where it is sub-divided into sales and purchasing system, accounting system and others.

b) (i) „Hard “ properties

„Hard“ properties are those properties that can be defined, measured and assessed in an objective. Examples of „hard “ properties approach are things like increase in sales, reduction in cost, etc

Characteristics:

- The problem can be defined.
- Information needs are known.
- The solution can be recognized once arrived at.
- Hard problems are object or things oriented.
- Standard solution technique.
- Data can be objectively assessed.
- Problems are self-contained.

(ii) „Soft“ properties

„Soft properties“ are those that are precise and matters of industrial values and tastes. Soft properties are not measured accurately. They include things such as customer goodwill, etc.

Characteristics:

- Problems are difficult to define.
- It is impossible to know information needed in advance.
- Unsure of what solution would look like.
- Problems are people oriented.
- These problems involve taste, value, opinion, judgement, etc.
- These problems have a lot of interaction e.g. motivation, satisfaction, affiliation needs, beauty, etc.

QUESTION FIVE

a) Differences between an expert system and a conventional data system:

A DSS is a form of management information system, which is designed to assist management in making semi-structured and unstructured decisions. This implies that some decisions are automated and others require judgement. The decision maker will use computers to do structured tasks of decisions while the other is the rest is judgement. An example of these decisions is investment decisions where data from automated sources is required.

An expert system is a system that acts as an expert consultant to the user. They are able to offer knowledge to the user through the use of knowledge base e.g. an system that diagnoses diseases.

The differences between DSSs and ESs are outlined in the following table:

Characteristics	DSS	ESS
Objective	To assist management in making unusual or unstructured decisions	To make unstructured decisions for users
Who makes the decision	Decisions are made by the managers	Decisions are made by the system.
Orientation	The system is designed to help managers solve problems of decision making	The systems are designed to make decisions for the user.
Applications	The system can be applicable in any functional area e.g. a spreadsheet as a DSS.	The system is applicable in one specific area e.g. a medical diagnosis system
Database	The database used is factual	The database used is analytical
Problem area	Complex, broad	Narrow domain
Types of problems	Ad hoc, unique	Repetitive

b) Factors which determine the suitability of ES are:

1. **Consistency**- where an organization requires consistency in decision making, an expert system is suitable as opposed to human experts.
2. **Few experts**- expert systems are prepared to reach areas where there are no human experts and can be used in more than one place at a time.
3. **Speed**-ES are suitable where the decision making is required to be fast.
4. **Permanency**- Expert systems are useful to store knowledge permanently and give instant accessibility when required.
5. **Repetitive**- suitable where the same decision is made over and over again.
6. **Hostile environment**- where human experts cannot work, then the expert system is suitable.
7. **Expenses**- ESs are suitable where there is no need to reduce expert expenses/costs.

QUESTION SIX

a) An agent of change is the one who brings about change. It is through an agent of change that new things come about. This is the thing that brings or initiates the change. In systems development, a systems analyst is taken as the agent of change. A system analyst's role in system development can be said to be the role of designing the programs and systems as a whole to perform the data processing work. The analyst is regarded as an agent of change due to the nature of his roles. The roles of the system analyst are:

- **Systems analysis**- involves methodological study of the current system so that a system of user requirements is obtained and a feasibility study carried out.

- **Systems design**- involves specification of input and output, storage or files, the processing, hardware and software and data processing security controls. At the end of systems design, a program specification is produced from flowcharts used to document the system's programs.
 - **Program and system testing**- involves uncovering errors in the programs of the system and in the operation of the system as a whole. Testing ensures that errors are uncovered and corrected thus guaranteeing the quality of the systems programs.
 - **Training**- involves educating users on the operation and security aspects of the system so as to ensure smooth changeover.
 - **Post implementation review**- the analyst conducts it to ensure that the system is a success.
- b) An analyst is the person who analyses information for the purpose of use by the organization. A systems analyst is the one who analyses the information before the development of a system. An external systems analyst is advantageous due to the following reasons:
1. An external analyst will carry out his work objective i.e. without fear and favour. The external analyst does not have any interest to protect or anything to do with the business and thus has a higher chance of doing good work.
 2. An external analyst will carry out his work thoroughly and will not assume some aspect of the analysis. This is because he is trained for this work and hence thorough work will be carried out.
 3. An external analyst will be more suited for the work as this is basically his/her profession thus quality work will be done.
 4. The external analyst will possess the required expertise and employee to carry out the work more quickly.
 5. The external analyst will not use the information obtained in his favour. This is because he is bound by professional standards in addition of having an interest in the business.
 6. Employees will find it easier to deal with an external analyst as some may feel the selection of an internal analyst is biased and hence will not divulge the information.

QUESTION SEVEN

Documentation is the recording of the information relevant in system development. It involves the recording of information that is relevant to the systems maintenance and running of the system. The documents prepared during SDLC are:

(i) Terms of reference

This document is made by the steering committee in the preliminary study. The document acts as a reference document throughout system development stages. This document contains:

- Project title.
- Subject of study.
- Purpose of study.
- Personnel.
- Reports.
- Available resources and constraints.
- Estimate duration and schedule.

It is important because:

- It provides information about the proposed solution.
- It acts as an authorisation document.
- It acts as a reference document.
- It sets out objectives of the proposed system.
- It acts as a control document.

(ii) Feasibility study report

This is the report that contains the findings and recommendation from the feasibility study. After the technical and operational feasibility and cost-benefit appraisal, a report is prepared that gives recommendations on whether or not to commit any further resources to the project. Its contents are:

- Introduction.
- Description of the alternative proposed solution in terms of the inputs, outputs, etc.
- Quantification to justify the cost of running the proposed system.
- Recommendation on the most effective alternative.
- Recommendations on the new system.

(iii) Fact finding reports

This is a report that contains information resulting from fact finding. Facts are recorded through the use of procedure charts, organization charts, decision tables, grid charts and pseudocode. These reports are relevant to the next stage of SDLC.

(iv) Statement of requirements

This is a formal report prepared after analysis of facts in SDLC. It's contents are:

- Description of initial system goals and whether they are being met.
- Description of whether the existing system is cost effective.
- Information on whether the output is effective.
- Description of existing system efficiency.
- This document is important as it helps the systems developer to understand the existing system and facilitate coming up with an efficient new system.

(v) System specification

This is a document prepared at the end of the design stage. It represents the conceptual system/logical system. Its contents are:

- Introduction of the existing system.
- Description of the proposed system.
- Justification of the proposed system as a solution to the specified problem.
- Comparison of the existing and proposed systems.
- Proposed system files descriptions.
- Proposed system control specifications.

QUESTION EIGHT

a) (i) Ways in which the system can realize cost savings:

- Reduction in labour costs by reduction or elimination of clerical personnel.
- Elimination of some specific costs e.g. stationary costs.

(ii) Intangible benefits that can be realized by a new system:

- Improved customer satisfaction.
- Better performance.
- Improved organizational image.
- Increased staff morale.
- A competitive advantage to an organization.

(iii) Methods of carrying out an investment appraisal:

- Accounting Rate of Return (ARR).
- Pay back period.

-
- Net Present Value (NPV).
 - Internal Rate of Return (IRR).
- b) (i) Factors considered in technical feasibility:
- The hardware required for the new system.
 - The software required for the new system.
 - Evaluation of current technology and how it's applicable to the new system.
 - Expertise of the employees and whether further training will be required.
- (ii) Circumstances under which a computer bureau is preferred as opposed to developing a new system:
- When it is cheap to use computer bureaux as compared to developing new systems.
 - When the system needed is temporary.
 - When there is lack of sufficient expertise within the organization and thus the external experts are desirable.
- c) (i) Factors to be considered in a social feasibility study:
- Effect of the system on the existing organizational structure.
 - Effect of the system on the current working practices and management levels.
 - Redundancy or retrenchment and implication to company as a result of the new system.
 - Implication of the system on existing staff development programmers.
- (ii) Role of the user during the feasibility study stage:
- The user will give information on the existing system and how the new system will affect them and how they feel.
- d) The main sections of a feasibility study report are:
- Introduction- this gives the general description of the existing system, the people contacted during the study and the purpose of the report.
 - Description of the alternative proposed systems in terms of the inputs, outputs, file processed, response times, etc.
 - Quantification to justify the cost of running the proposed system.
 - The recommendation by the analyst on the most cost-effective alternative solution.
 - The author of the report.
 - Recommendations on the new system indicating whether to commit further resources.

REVISION PAPER 5

QUESTION ONE

- a) **Hardware** is the physical or tangible parts of a computer system. This encompasses motherboard, CPU, expansion cards, peripherals such as monitor etc. The hardware is the parts of a computer that carry electrical (or optical etc) signals between the input, output, processor and storage devices. Hardware is generally made by professional manufacturers. **Software** is the digital instructions or data that a computer needs to operate. It is the software that supplies the instructions for the hardware to operate. These instructions and data are held on hard disks, floppy disks, CDROM, pen drives etc. Software may be held temporarily in RAM during the operation of a program. Any user may write software. Software can be system software, application software and data.

Similarities and Differences: Software supplies the information required by the hardware for the computer to operate. Both software and hardware are needed for a computer to operate.

- b) **Broadband** uses analogue signaling and is more expensive than baseband. Its strength is its capacity. It can carry a wide variety of traffic on many channels simultaneously using FDM. This technology is more complex than baseband and needs fine-tuning to operate at optimum performance. Broadband systems use modems at each end of the channel which are more expensive than the digital transceivers of baseband systems.

Baseband uses digital signaling which by its nature uses the entire frequency spectrum of the cable. Each node's signal is applied directly to the medium. Only one transmission can be handled at any one time. TDM is used in baseband signaling. It is cheaper than broadband and much simpler to implement and get running.

Similarities and Differences: Both can carry several users' traffic across one medium. Baseband is cheaper than broadband.

- c) **CD-ROM** is a plastic platter containing concentric circles of information that have been formed into the surface of the disk by a moulding technique. It is written once and cannot be altered. Its capacity is around 650 Mbytes although higher capacities up to 800 MB are available. These disks are commonly used for data or music. The information is stored optically, bits being represented by reflective pits formed on the reflective surface of the disk. CDRW disks are also available that can be written to many times.

Floppy disk is a magnetic disk protected within a plastic sleeve. The information is held in concentric circles known as tracks. It may be read to and written from many times. Its capacity is 1.44 Mb, although 720 K byte disks are still in use. It is commonly used to store small files such as word-processed files. The information is stored magnetically in the form of dots on the disk surface.

Similarities & differences: These are both used for data storage although the data capacity of the floppy disk is much smaller than that of a CDROM. A floppy disk may be written to but a CDROM cannot once it has been created.

- d) A **CPU** is the Central Processing Unit that forms a computer. This microprocessor is a microchip that is at the heart of a microcomputer system. It takes instructions from memory (the program) one at a time and performs the actions specified by the instructions on the data that has been supplied/ defined. Microprocessors are often measured in MHz which refers to the clock speed of the processor. It describes the number of cycles per second that the CPU is capable of performing. It has temporary storage areas known as registers to hold intermediate results.

ROM is Read Only Memory. It is a non-volatile storage space used to store boot commands for a computer. It has much smaller storage area than RAM. It is a microchip held on the motherboard. Its contents cannot easily be altered. It is used at system boot but not once the system is booted.

Similarities and Differences: CPU carries out mathematical and logical operations. ROM stores data for boot purposes. Both are microchips held on the motherboard.

QUESTION TWO

- a) CASE stands for computer aided software/system engineering. A CASE tool is a software package that supports the construction and maintenance of logical system specification models. Many CASE tools are designed for a specific methodology and so support the rules and interaction of the models defined in that methodology. More sophisticated tools permit s/w prototyping and code generation.
- b) **Documentation**-the graphical editing facilities provided by all CASE tools means that high quality, easily read documents can be produced. Furthermore changes to those documents can easily be made and charts and models re-printed. Such editing is particularly useful with diagrammatic models, such as DFDs and entity relationship models. It is very difficult to maintain manually produced versions of these diagrams.

Standards-these define how development will be carried out. Individual models have standard rules of construction e.g. a data store cannot be linked directly to an external entity a DFD. However there is nothing to stop the designer making such a connection in a manually produced version and it will not be picked up until assessed in a quality review. A CASE tool cannot produce such a diagram because it is not allowed to and in this way the CASE tool ensures that standard construction rules are adhered to.

Data dictionary-this stores information about the constituent parts of the logical data systems specification. There will be logical data dictionary entries for data flows, data stores etc.. A manually compiled example is difficult to maintain and analyze. A CASE tool will hold all this information in a computerised data dictionary. Reports and analysis will be available. The logical data dictionary will also support the consistency checks performed by the CASE tool, cross referencing, for instance, the logical data stores of the DFD to the entities of the entity relationship diagram.

Prototyping-this can be supported in one of two ways. , through developing screens and output prints for the input and output data flows. Each dataflow is defined in its logical content in the data dictionary. The CASE tool may allow these logical contents to be displayed on a demonstration screen and to link these screens together using menus and other dialogue structures. Thus the user sees a demonstration of the system through the CASE software. A second possibility is for the CASE tool to offer program and data generation. Such tools convert the process descriptions of the logical data dictionaries into programs and the data stores/entities into files/databases. The user can then experiment with the software. Any changes in requirements are made in the definition of the models and the system regenerated for further use. In this way the models and actual system are always in harmony.

QUESTION THREE

- a) Quality is a term meaning different things to different people e.g. making sure it is correct, doing it right first time. In this context it is likely that the best definition of the term is ,conforming to the customer's requirements where the customer can be either an external customer (a client) or an internal customer (a colleague) and, requirements relate to both the product and service delivered. Here too the application developers will take on the role of supplier. In both internal and external customer-supplier relationships the supplier must first talk to the customer to ensure they understand fully the requirements if a quality product or service is to be delivered. The requirement will include details of:
- what is required;
 - the most appropriate way of delivering it;
 - the involvement and contribution expected from each party during the process

According to the above definition, what the customer thinks about the quality of the product is all that counts. One can only speak of better product quality only if the customer perceives the product to be better, regardless of objective factual improvements.

- b) Utilizing a structured approach to system development, completion of each stage of a project would represent a 'milestone', the deliverables of which has to be signed off by the developer and customer before the next stage begins. This ensures that not only does the system work when it finally goes live but also that the client is in full agreement with the interpretation of the requirements from earliest stage through to final implementation.

Documentation techniques such as DFDs (Data flow diagrams), LDSs (Logical data structures), or ELH (Entity life histories) can also be of benefit in clarifying processes and data.

Two techniques used could be:

- **Structured walkthrough**—This is a review of products at the end of a stage in the development of a system. The prime objective of the walkthrough is to identify problems and initiate the necessary corrective action.
- **Inspections**—This is a formal examination of an item, against a previously produced item, by a group of people led by an independent chairperson, with the objectives of finding and recording defects using standardized checklists and techniques, initiating rework as necessary, monitoring the rework accepting the work, based on stated exit criteria, and adding to and utilizing a base of historical data.

QUESTION FOUR

- a) The purchaser of software usually pays for some or all of the following:
- A license
 - An installation guide
 - The installation of the software
 - Maintenance and updates
 - A support contract
 - User guides
 - A reference manual
 - A quick reference guide
 - Training
 - Membership of a user group

b) A license.

The purchaser pays a license fee, which gives the right to use the software on a particular computer or a specified number of computers on a particular site. Alternatively, a site license may be paid for which entitles the purchaser to use the software on any computer at a particular place.

An installation guide.

The guide starts by providing information about what hardware is needed to enable the programs to run satisfactorily. It then goes on to describe the procedures to be followed in order to set up the software so that it can be used satisfactorily and efficiently on a particular kind of computer.

The installation of the software.

A purchaser may not have the necessary expertise to set up the software, or may find it too time consuming or trouble- some to carry out. In such cases the purchaser may be able to pay an additional fee to have the software installed.

Maintenance and updates.

It is unfortunately not uncommon for programs to be supplied which may be faulty in some way. Sometimes these faults do not come to light until some time after the software has been delivered and put to use and will issue "bug fixes". Licensed purchasers may get some of these changes provided free of charge, perhaps during the first year of use. Subsequently the purchaser may be able to pay an annual fee for maintenance and updates.

A support contract.

A purchaser experiencing problems with software will want to be able to turn to the supplier for help. It is very common for businesses to have support contracts that provide telephone assistance during the working day.

User guides.

A user guide is usually a manual provided for an end-user to enable them to learn how to use the software. Such guides usually use suitable examples to take the user through the stages of carrying out various tasks with the software.

A reference manual.

A reference manual is normally intended to be used by a user who already knows how to use the software but who needs to be reminded about a particular point or who wants to obtain more detailed information about a particular feature.

A quick reference guide.

These are single sheets or cards, small enough to fit into a pocket, which the user may keep handy for help with common tasks carried out with the software.

Training.

In addition to providing user guides the software supplier may provide training courses on how to use the software.

Membership of a user group.

A user group is a club for individuals or organizations that use a particular hardware or software product. The club is often run and partly sponsored by the supplier. Members of user groups may have meetings or receive newsletters which enable them to find out more about the product and how to use it.

QUESTION FIVE

a) The term "file" is used to describe a collection of related data records.

b) Master file.

These are files of a fairly permanent nature, e.g. customer ledger, payroll, inventory, etc. with regular updating of these files to show a current position. For example customer's orders will be processed, increasing the "balance owing" figure on a customer ledger record. These records will contain both data of a static nature, e.g. a customer name and address, and data that which will change each time a transaction occurs, e.g. the "balance" figure.

Movement/transaction file.

This is made up of the various transactions created from the source documents. In a sales ledger application the file will contain all the orders received at a particular time. This file will then be used to update the master file. As soon as it has been used for this purpose it is no longer required (except perhaps as a backup). It has a very short life because a new file containing the next set of orders will replace it.

c) Factors that should be considered:

Access to files

Key fields: When files of data are created the user will need a means of access to particular records within those files. This is done by giving each record a "key" field by which the record will be recognized or identified (accessed), and is normally a unique identifier of a record (primary key). Examples of key fields are:

- Customer number in a customer ledger record.
- Stock code number in a stock record.
- Employee clock number in a payroll record.

Storage Devices

The type of storage device used is very important.

- Magnetic or optical disk. These are direct access media and are for storing files on-line.
- Magnetic tape. This medium has significant limitations because it is a serial access medium. For example, batch or backups.

Processing Activities

Access to particular records in order to process them. For example:

- Updating. How often, in what order, and hit rate
- Referencing. When access is made to a particular record, e.g. reference is made to a "prices" file during an invoicing run
- File maintenance. Records can be added and deleted. Also prices and customers' **addresses change and have to be —inserted to bring the file up to date**
- Volatility. How often will records be added/deleted?

Fixed-Length and Variable-Length Records

The problem of fixed or variable length records is one that does not have to be considered in manual systems.

- Fixed. Every record in the file will be of the same fixed number of fields and characters and will never vary in size.
- Variable. This means that records in the file may not be of the same size. This could be for two reasons:
 - Some records could have more fields than others. With invoicing a new field could be added to a customer record for each invoice. So a customer's record would vary in size according to the number of invoices he had been sent.
 - Fields themselves could vary in size. A simple example is "the name and address" field because it varies widely in size.

HIT RATE

This is the term used to describe the rate of processing of master files in terms of active records. For example, if 1,000 transactions are processed each day against a master file of 10,000 records, then the hit rate is said to be 10% hit rate is a measure of the "activity" of the file.

OTHER FILE CHARACTERISTICS

Apart from activity, which is measured by hit rate, there are other characteristics of the file that need to be considered. These are;

- **Volatility.** This is the frequency with which records are added to the file or deleted from it.
- **Size.** This is the amount of data stored in the file.
- **Growth.** Files often grow steadily in size as new records are added. Growth must be allowed for when planning how to store a file.

QUESTION SIX**Classification of Security risks**

- a. Accidental damage is due to causes such as rain (damages electrical equipment due to short circuits), dust (causes disk crashes), earthquake (may result in destruction of data processing infrastructure), lightning (may cause fires at sites), humidity, temperature (may cause equipment components to burn out due to overheating), fire, magnetic storm, as well as water, explosion, damage to H/W and S/W by mishandling etc. Possible counter-measures:
- Duplication of site- to protect from the risk of data destruction due to earthquakes, floods, and fires.
 - Contract backup organizations- they have necessary expertise and facilities to implement effective backup procedures.
 - Inert gas flooding of mainframe computer room- to kill fires.
 - Air conditioning- to reduce dust and high temperatures.
 - Careful siting of equipment- to avoid locating the organization's data processing sites in flood prone areas and earthquake prone areas.
- b. These consist of unintentional errors made by programmers during development, operators loading wrong storage media, etc. and users pressing incorrect keys, etc. Possible counter-measures:
- Program walk-throughs/reviews- to identify program errors and initiate corrective action.
 - Software detection of loaded storage media.
 - Confirmatory messages before acceptance of program- to confirm users' actions e.g. confirmation messages before deletion of files.
- c. This consists of intentional acts by personnel to steal hardware, software and storage media, withhold data, collect expense/wages by illegal use of input documentation etc. all for personal gain. Possible counter-measures:
- Access protection of storage media- to counter unauthorized modification of data.
 - Read-only files- these cannot be modified thus enabling the data content to remain unaltered.
 - Software librarian- to control the movement of software CDs thus preventing theft or unauthorized usage of CDs.
 - Hierarchical password protection on , 'need to know' basis- to limit access to sensitive data.
- d. Sabotage may be perpetrated by personnel who have a grudge against the organization of some form e.g. a grudge due to dismissal, who sabotage the computer system in some way, often by adding illegal routines in key software etc. Also removal of data, programs for sale to competitors.
- Possible counter-measures:
- Access protection of storage media
 - Read-only files
 - Software librarian- acts as a control mechanism to prevent dismissed/unauthorized employees from accessing software CDs.
 - Hierarchical password protection on , 'need to know' basis
 - Immediate removal of personnel if made redundant/resign. They should not be allowed back to their desks after they have collected their belongings. This prevents them from having a chance to sabotage the organization's information system from within.
- e. Mischief is usually perpetrated in the form of external attacks by 'hackers' to try and illegally by-pass security measures in computer systems and leave some form of notice that

they had succeeded. The attack is often just an 'ego trip' as data not damaged. Possible counter-measures:

- Password protection
- Call-back before access considered
- Firewall protection systems

f. A virus is a self loading program that automatically spreads itself to every disk in the personal computers that it comes into contact with. They may block the computer, damage the data and operation systems and be very difficult to remove. With the advent of the WWW and email traffic they have caused irritation and damage throughout the world of personal computers. Possible counter-measures:

- Firewall protection systems- to filter external traffic coming into an organization's network.
- Anti-virus software- to detect and clean out viruses from the organization's computers
- Removal of local A- Drive and CD_R/RW- drives for Desktops- to protect systems from the risk of viruses being introduced through floppy disks and compact disks.
- Immediate dismissal of employees if found loading private disks in desktops

QUESTION SEVEN

(a) Business Issues: to be considered

The most important aspect is to validate the business strategy and create a viable business model to support this strategy. This includes positioning the company in the competitive marketplace.

The company needs to decide if it is going for the mass market as a low cost supplier, concentrate on the differentiated higher perceived quality/higher priced mass market or focus on a narrower more specialized market.

What type of customer is the company going to seek to attract?

What type of holiday is it going to offer, what is the price bracket?

Is it going to compete on price or differentiation?

Destinations offered /activity or beach?

Likely age range of customers?

Is customer segment that it is seeking to attract likely to have access to the Internet or be keen to use to book holidays?

If it is not, then the strategy is not likely to be successful!

Also you need to be aware of your competitors in the marketplace, how do you compete?

What is your unique selling point (USP)?

Now, how are you going to make customers aware of your web site? Newspaper, TV Advertising? Seeding your web-site details into the search-engines?

(b) Technical Issues to be considered:

Next, we come to web-site design and development. How do we make our web site attractive and easy to use?

What tools do we use to develop and maintain it? The issues on ease of use may include a trade-off on 'attractiveness', i.e. good graphics and photographs and download times. One would expect photographs of locations and accommodation on a travel company web-site but we might have to be careful and separate indexes, pricing, availability and booking pages from the photographs to allow quick and easy navigation around the site, with the slower downloading of photographs, cross-referenced to be accessed on demand.

Issues of security (integrity of booking data, security of payment data) need to be designed in to the system. For transmission of payment details (credit cards etc) encryption may need to be considered. When is a transaction and booking completed?

Can provisional bookings be made? Also, we may need to consider issues of back up; if there is a service disruption can we design in 'graceful degradation', and provide a partial service?

We need to plan for operational issues, where is the web site to be hosted and how do we plan for the assurance of business continuity? We may also need to consider telephone call centre support or clerical answering of e-mail queries. Finally we need to monitor the business and operational effectiveness of the system and to plan for maintenance, updating and eventual replacement.

QUESTION EIGHT

Before embarking on designing security procedures a risk analysis would be required; this would require answering the following questions:

- What is the nature of the data being stored in the system?
 - How will the data be used?
 - Who will have access to the system?
 - How much money will the organization lose if the data is lost, corrupted or stolen?
- Risk assessment** –in this scenario we have to take account that the system is central to the business strategy and that access to the Internet requires an 'open interface' which increases the risk of malicious intrusion and that the system would be at the core of the company's business:
- Identifying possible areas of risk;
 - Estimating the probability of their occurrence, and
 - Quantifying the impact if they should occur
 - Estimating the cost of removing or minimizing the risk

This would enable decisions to be taken on each risk identified. The choices open to us are:

- risk avoidance;
- risk reduction;
- risk acceptance;
- risk transfer.

and the prioritization of investment in providing counter-measures or accepting the risk would be based upon an evaluation of the costs and benefits associated with each decision.

Security issues to be considered can be covered under the headings of Confidentiality; Integrity, and Availability and continuity of service.

Confidentiality.

Confidentiality is ensuring that information is made available only to those authorized to have access to it. In this case, with a travel agent, high risk is incurred because we want to give the general public easy entry to the system and to allow them to make a booking. But we need to ensure that personal data that we capture as part of the booking or marketing process is not accessed by unauthorized users. We would also not want to make it easy for our own staff to take copies of any customer details to pass on to third parties. So access to parts of our database would be limited by password or physical identifier. Measures adopted to protect personal data must conform to national Data Protection laws.

Integrity

Integrity is preserving the accuracy of the data that is held and keeping it secure from unauthorized amendment. Updating holiday availability, accurate and secure transmission and filing of payment and financial data – all need to be planned for, with the creation of updating and data validation policies, limitation of functions to certain users or terminals, creation of control totals, creation of audit trails.

Availability (continuity of service)

This means ensuring that continuity of service provision to external and internal customers is maintained. This means, starting at the design stage, looking at the areas of greatest vulnerability and least resilience, i.e. those most likely to fail. Then evaluating how best to improve the resilience within the bounds of value for money. This will involve designing some redundancy into the system by duplexing vulnerable pieces of equipment but also designing in 'graceful degradation', the ability to continue to operate, albeit with a service of reduced functionality when there is a partial breakdown. We also need to design fallback procedures, possibly manual, in the case that this does not prove possible. Finally, we need to design in the back-up and recovery procedures. The daily copying of files and the remote storage of files and programs to effect recovery in the event of a (physical) disaster. We must not forget the need to plan to periodically test the effectiveness of these procedures.

A typical management security policy would cover the following aspects:

- User awareness and education;
- Administrative controls;
- Controls over system development and maintenance
- Operations controls;
- Firewall to protect against intrusion from Internet
- Physical protection of data
- Access control to the system and data;

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