



CARIBBEAN EXAMINATIONS COUNCIL

CAPE[®] Information Technology

SYLLABUS
SUBJECT REPORTS

Macmillan Education
4 Crinan Street, London, N1 9XW
A division of Macmillan Publishers Limited
Companies and representatives throughout the world

www.macmillan-caribbean.com

ISBN 978-0-230-48290-6 AER
© Caribbean Examinations Council (CXC®) 2015
www.cxc.org
www.cxc-store.com

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First published 2014
This revised version published 2015

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Cover design by Macmillan Publishers Limited and Red Giraffe

Information Technology

Information Technology is the study, design, development, implementation, support and management of computer-based information systems, including software applications and computer hardware. The CAPE Information Technology Syllabus will enable students to use technology to participate in, and contribute to the new technological world. They will become conscious of the impact of Information and Communication Technologies, and how the appropriate use of Information Technology can help to solve the problems, including those of an economic, social or personal nature. This syllabus emphasises the importance of Information Technology to the economic and social development of the region.

This syllabus is arranged into TWO Units, each made up of three Modules.

UNIT 1: INFORMATION TECHNOLOGY THEORY

- Module 1 – Fundamentals of Information Technology
- Module 2 – Information Technology Systems
- Module 3 – Information and Problem-Solving

UNIT 2: APPLICATION AND IMPLICATION

- Module 1 – Information Management
- Module 2 – Use of Information Technology Tools
- Module 3 – Social, Organizational and Personal Issues



CARIBBEAN EXAMINATIONS COUNCIL

**Caribbean Advanced Proficiency Examination
CAPE[®]**

**INFORMATION TECHNOLOGY
SYLLABUS**

Effective for examinations from May/June 2008

Published by the Caribbean Examinations Council

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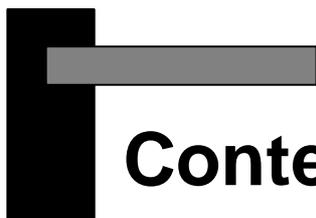
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This document CXC A4/U2/08 replaces CXC A4/U1/01 issued in 2001.

Please note that the syllabus was revised and amendments are indicated by italics.

First Issued 1998

Revised 2001

Revised 2008

Revised 2013

Please check the website www.cxc.org for updates on CXC's syllabuses.



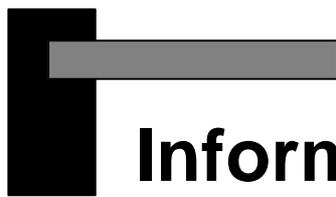


Introduction

The Caribbean Advanced Proficiency Examination (CAPE) is designed to provide certification of the academic, vocational and technical achievement of students in the Caribbean who, having completed a minimum of five years of secondary education, wish to further their studies. The examinations address the skills and knowledge acquired by students under a flexible and articulated system where subjects are organised in 1-Unit or 2-Unit courses with each Unit containing three Modules. Subjects examined under CAPE may be studied concurrently or singly.

The Caribbean Examinations Council offers three types of certification. The first is the award of a certificate showing each CAPE Unit completed. The second is the CAPE diploma, awarded to candidates who have satisfactorily completed at least six Units, including Caribbean Studies. The third is the CAPE Associate Degree, awarded for the satisfactory completion of a prescribed cluster of seven CAPE Units including Caribbean Studies and Communication Studies. For the CAPE diploma and the CAPE Associate Degree, candidates must complete the cluster of required Units within a maximum period of five years.

Recognised educational institutions presenting candidates for CAPE Associate Degree in one of the nine categories must, on registering these candidates at the start of the qualifying year, have them confirm in the required form, the Associate Degree they wish to be awarded. Candidates will not be awarded any possible alternatives for which they did not apply.



Information Technology Syllabus

◆ RATIONALE

The Information Technology Syllabus for the Caribbean Advanced Proficiency Examination (CAPE) reflects the belief that Information Technology is essential to the economic and social development of the region.

The widespread use of Information Technology, the tools and techniques for *inputting, processing, storing, outputting, transmitting and receiving* information, which was made possible because of improvements in computer and telecommunications technology, has significantly changed society. A large proportion of business transactions is now performed over computer networks. *The Internet and multimedia computers have had a significant impact on the ways in which people work, learn, communicate, conduct business, and on the ways they seek entertainment. The increased integration of computer and telecommunications technology has led to an increased globalisation of the world economy.* Moreover, as the world becomes familiar with the potential of Information Technology, people are beginning to realise that many problems and situations which were hitherto thought of as primarily involving physical activities, in fact rely for their solution on the ready availability of relevant information.

In order for the Caribbean to participate in and contribute to this new world, it is essential that Caribbean people become familiar with this technology. This not only implies that we must know how to use the technology from a purely technical point of view; but also means that we must be conscious of the impact of Information Technology. In particular, we must be made aware that the appropriate use of Information Technology can help solve the problems that we are facing in their daily lives, whether they be of an economic, social or personal nature, and that Information Technology provides opportunities for economic development, as well as for further integration, of the region. However, the increased use of Information Technology also raises a number of ethical, legal and political issues, ranging from questions concerning privacy of information about individuals, to intellectual property rights.

The introduction of Information Technology without careful consideration often worsens a problem, rather than solves it. Any decision to turn to Information Technology must, therefore, be preceded by a critical analysis of the strengths and weaknesses of the proposed solution. In addition, Information Technology has made access to information and misinformation far easier. It is, therefore, crucial that anyone, before using any information, first critically evaluate its reliability.

Given the preceding, a student who completes this syllabus will be empowered to satisfy the criteria for the Ideal Caribbean Person as articulated by the CARICOM Heads of Government. Such a student, according to the UNESCO Pillars of Learning, will also learn to know, to be, to do, and to live with others thus transforming self and society.

◆ AIMS

The syllabus aims to:

1. develop an awareness of the importance of information in the solution of many problems;
2. develop *a critical attitude* to gathering, processing and evaluating information;
3. *develop a broad understanding of hardware, software, networks, databases and information systems and their uses;*
4. *sensitise students to the use of Information Technology* in conducting and living their daily lives;
5. develop an awareness of the power and pitfalls of Information Technology;
6. develop an awareness of the ethical, legal and political considerations associated with information technology;
7. *assist students in solving* real-life problems, using the tools and techniques of the computer and computer-related technologies;
8. *encourage students to use* information sources and services to retrieve, interpret and communicate information;
9. develop a positive attitude to new and emerging technologies in Information Technology.

◆ SKILLS AND ABILITIES TO BE ASSESSED

The skills that students are expected to have developed on completion of this syllabus have been grouped under three headings:

1. Knowledge and Comprehension;
2. Application and Analysis;
3. Synthesis and Evaluation.

Knowledge and Comprehension

The ability to:

- recall and grasp the meaning of basic facts, concepts and principles of Information Technology;
- identify real-life problems for which Information Technology solutions are appropriate and beneficial.

Application and Analysis

The ability to:

- use facts, concepts, principles and procedures in unfamiliar situations;
- identify and recognise the relationships between the various components of Information Technology and their impact on society;
- recognise the limitations and assumptions of data gathered in an attempt to solve a problem.

Synthesis and Evaluation

The ability to:

- make reasoned judgements and recommendations based on the value of ideas and information and their implications;
- use the computer and computer-based tools to solve problems;
- justify and apply appropriate techniques to the principles of problem-solving.

◆ PRE-REQUISITES OF THE SYLLABUS

Any person with a good grasp of the Caribbean Secondary Education Certificate (CSEC) Information Technology Syllabus, or its equivalent, should be able to pursue the course of study defined by this syllabus. However, successful participation in the course of study will also depend on the possession of good verbal and written communication skills.

◆ **STRUCTURE OF THE SYLLABUS**

This syllabus is arranged into TWO Units, each made up of three Modules. Whilst each Module in each Unit is independent, together they form a coherent course of study which should prepare candidates for the world of work and studies at the tertiary level.

UNIT 1: INFORMATION TECHNOLOGY THEORY

- Module 1 - Fundamentals of Information Technology
- Module 2 - Information Technology Systems
- Module 3 - Information and Problem-Solving

UNIT 2: APPLICATION AND IMPLICATION

- Module 1 - Information Management
- Module 2 - Use of Information Technology Tools
- Module 3 - Social, Organizational and Personal Issues

In order to be successful, students should spend at least 50 hours of the 150 hours per Unit in a computer lab or on a computer at home or in the workplace.

◆ UNIT 1: INFORMATION TECHNOLOGY THEORY

MODULE 1: FUNDAMENTALS OF INFORMATION TECHNOLOGY

GENERAL OBJECTIVES

On completion of this Module, students should:

1. develop an understanding of how Information Technology (IT) relates to other disciplines in Computing;
2. develop an understanding and appreciation of data and information, and the distinction between them;
3. develop an understanding of the nature and sources of information;
4. develop an understanding and appreciation of Information Technology and its history.

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

- | | |
|---|---|
| 1. explain the concept of Information Technology; | Definition and scope of Information Technology; application of tools for informational purposes. |
| 2. describe the relationship between Information Technology and other disciplines in Computing; | Computing, Computer Science, Software Engineering, Computer Engineering, and Information Systems; commonalities and differences between disciplines. |
| 3. explain the characteristics of data and information; | Definition of terms; examples.
<i>Data:</i> include unprocessed, unorganised and discrete (in separate, unrelated chunks), qualitative (opinion-based, subjective) or quantitative (measurement-based, objective), detailed or sampled .

<i>Information:</i> including distortion, disguise, reliability, inconsistency, incomprehensibility, subject to interpretation, value, relevance, confidentiality, timeliness, completeness, security, shareability, availability, lifespan, information as a commodity, format and medium; Nature and structure of information: strategic, tactical, operational; structured, semi-structured and unstructured. |

UNIT 1

MODULE 1: FUNDAMENTALS OF INFORMATION TECHNOLOGY (cont'd)

SPECIFIC OBJECTIVES	CONTENT
<i>Students should be able to:</i>	
4. distinguish among data, information and knowledge;	Differences among data, information and knowledge.
5. explain information processing;	<i>Definition of information processing (input process, output process); manual versus automated information processing; components of manual information processing: collect, collate, analyze, present and disseminate; components of automated information processing: input (data capture or entry), process (for example, analyze, sort, calculate), store, retrieve, output (present and disseminate); transmit data and information. Interrelationship between data and information through information processing.</i> <i>Types of manual and automated information systems.</i>
6. discuss the importance of data and information;	Use of information in decision making: data quality; appropriateness of data. Nature and structure of information: strategic, tactical, operational; structured, semi-structured and unstructured.
7. identify ways of representing data and information;	<i>Data: including character, string, numeric, aural (for example, Morse Code, musical notes), visual (for example, the individual frames of a movie, fingerprints); musical symbols.</i> <i>Information: including text, graphics, sound, video, special purpose notations (mathematical, scientific and musical notations); graphical representations (graphs and charts); tables.</i>
8. discuss various types of information sources;	<i>Types of information sources: including books, journals, catalogs, magazines, newspapers, online libraries, CD-ROMs, DVDs, electronic databases, web sites, people, blogs, wikis; advantages, disadvantages of information sources.</i>

UNIT 1

MODULE 1: FUNDAMENTALS OF INFORMATION TECHNOLOGY (cont'd)

SPECIFIC OBJECTIVES	CONTENT
<i>Students should be able to:</i>	
9. identify characteristics of information sources;	Include availability, cost, currency of information, amount of detail (depth), breadth of coverage, reliability, format and medium.
10. identify tools used in the entry, retrieval, processing, storage, presentation, transmission and dissemination of information;	Examples of hardware, software, and communication tools. Tools associated with the Internet including on-line services; search engines; Usenet, Internet Relay Chat (IRC), telnet, ftp, newsgroups, message board, mailing list, Internet telephony.
11. Justify the tools used in Information Technology;	Hardware, software and communication tool used in the entry, retrieval, processing, storage, presentation, transmission and dissemination of information; advantages and disadvantages.
12. outline the history of Information Technology;	Brief history of computer hardware and software, Internet and telecommunications; categories by size, cost, and processing ability.
13. explain the meaning of terms related to telecommunication.	Transmission media, channels, receivers, senders, modulation, bandwidth; telecommuting.

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Module, teachers are advised to engage students in the teaching and learning activities listed below.

1. Use the Internet to source relevant material.
2. Compile a glossary of terms using the Internet, computer magazines, textbooks and other information sources. This could form the basis of an in-class discussion.
3. Develop and use diagrams to represent the concepts and relationships contained in the Specific Objectives.
4. Invite resource persons with experience in the innovative use of Information Technology in fields, such as business and entertainment, to speak on relevant issues.
5. Develop manual filing system and compare functions, such as retrieval and sorting, with automated information system.

UNIT 1

MODULE 1: FUNDAMENTALS OF INFORMATION TECHNOLOGY (cont'd)

RESOURCES

- Daley, B. *Computers are your Future*, New Jersey: Pearson Prentice Hall, 2007.
- Heathcote, P. *A Level Computing*, Letts, London: Letts, 2005.
- Long, L. and Long, N. *Computers: Information Technology in Perspective*, New Jersey: Prentice Hall, 2004.
- Parson, J. and Oja, D. *Computer Concepts*, New York: International Thompson Publishing Company, 2007.
- Shelly, G., Cashman, T., and Vermaat, M. *Discovering Computers*, New York: International Thompson Publishing Company, 2008.

UNIT 1

MODULE 2: INFORMATION TECHNOLOGY SYSTEMS

GENERAL OBJECTIVES

On completion of this Module, students should:

1. develop an understanding of the components of Information Technology Systems;
2. develop an appreciation for human computer interaction (HCI);
3. develop an awareness of security measures associated with information technology systems;
4. develop an awareness of the structure of the World Wide Web and its standards and protocols.

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

- | | |
|--|---|
| 1. describe Information Technology Systems; | Definition; types of Information Technology Systems; examples. |
| 2. identify the components of an Information Technology System; | Hardware, software, network, users: end-users and IT professionals; definitions and examples. |
| 3. describe the purpose and functions of hardware components; | Purpose, functions and types of hardware including input, output, storage, processor and peripheral devices; definitions and examples; interaction between hardware components. |
| 4. describe the purpose and functions of software components; | Purpose, functions and types of software including application, system (operating systems, language translators, and utilities); proprietary versus open source software; information systems including embedded systems: monitoring and control systems; data processing systems; management information systems, decision support systems, executive information systems; expert systems, data warehouses; definitions and examples; major input and output from each type of information system, such as data, information, processed transactions, reports including detailed, summarised, exception, ad hoc. |
| 5. explain the various stages of the system development life cycle (SDLC), and software engineering; | Including feasibility study, analysis, design, development, implementation, review; deliverables/output of each stage including system proposal, project plan, various diagrams and charts, information system (software) test plans, conversion plans, documentation including user and technical manuals. |

UNIT 1

MODULE 2: INFORMATION TECHNOLOGY SYSTEMS (cont'd)

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

- | | | |
|-----|--|--|
| 6. | <i>discuss the tools used in the different stages of the (SDLC);</i> | <i>Including questionnaires, interviews, observation, review/investigation of printed material, ER diagrams, data flow diagrams, process models, object models, decision tables and trees, computer-aided software engineering (CASE) tools, GHANT charts, prototypes, flowcharts, pseudocode, programming languages.</i> |
| 7. | <i>describe the purpose and functions of network components;</i> | <i>Purpose, functions and types of networks including local area network (LAN), wide area network (WAN), metropolitan area network (MAN); virtual private network (VPN); Internet; Intranet; Extranet; configuration; topologies; transmission media: (wired versus wireless): fibre-optic, Unshielded Twisted Pair (UTP); hotspots, protocols; definitions and examples; network security; firewalls.</i> |
| 8. | <i>explain the roles of users;</i> | <i>Inclusion of IT professionals, end users: expert users, novice users; definitions and examples.</i> |
| 9. | <i>compare the various features associated with the components of Information Technology Systems;</i> | <i>Features including, speed, efficiency, portability, maintainability, storage, transmission.</i> |
| 10. | <i>describe the interrelationship between the components in an Information Technology System;</i> | <i>Relationship between the components: hardware, software, network, user.</i> |
| 11. | <i>describe different types of HCI;</i> | <i>Types of HCI including forms, menu, command line, natural language, graphical user interface (GUI), speech and direct manipulation.</i> |
| 12. | <i>distinguish between different types of HCI;</i> | <i>Types of HCI including forms, menu, command line, natural language, graphical user interface (GUI), speech and direct manipulation.</i> |
| 13. | <i>describe ways in which a user's characteristics require adaptation of a user interface to increase effectiveness;</i> | <i>For example, age, education, differently abled and cultural differences, non-visual interfaces, sensors, accessibility features; differences.</i> |

UNIT 1

MODULE 2: INFORMATION TECHNOLOGY SYSTEMS (cont'd)

SPECIFIC OBJECTIVES	CONTENT
<i>Students should be able to:</i>	
14. compare various security mechanisms;	Physical access control versus logical access control measures and devices; including passwords (characteristics of an effective password- not obvious, length, mixed case, alphanumeric); authentication, encryption, swipe or key cards, biometric; data integrity.
15. explain the meaning of terms related to the security of Information Technology Systems;	For example, data security, passwords, authentication, encryption, data corruption.
16. describe the structure of the World Wide Web (WWW) as interconnected hypertext documents;	Hyperlinks, home page, web page versus web site; Hypertext Transfer Protocol (HTTP), universal resource locator (URL), hypertext markup language (HTML), extensible markup language (XML); IP address versus domain name.
17. discuss Internet standards.	Hypertext Transfer Protocol (HTTP); Transfer Control Protocol/Internet Protocol (TCP/IP) in terms of specifications, guidelines, software and tools.

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Module, teachers are advised to engage students in the teaching and learning activities listed below.

1. Identify a user of a microcomputer system in an office environment and conduct an interview to ascertain which software tool is used by the user and why. Discuss specific features of the software that makes it suited to the given task. Determine if a more appropriate software tool could be used for the task, identify the software tool and explain why it is more appropriate.
2. Compile a glossary of terms using the Internet, computer magazines, textbooks and other information sources. This could form the basis of an in-class discussion.
3. Identify two examples of a HCI and make a presentation comparing and contrasting those interfaces.
4. Use the example of a person driving a car and interacting with the instruments on the dashboard as an opportunity to introduce HCI.

UNIT 1

MODULE 2: INFORMATION TECHNOLOGY SYSTEMS (cont'd)

5. Identify HCI used in different organizations (for example, restaurants, hospitals, recording studios, security firms, scientific labs) and by the student (for example, ipod, gaming consoles, cell phone, web pages) and evaluate these designs based on a set of identified criteria.
6. Develop and use diagrams to represent the concepts and relationships contained in the Specific Objectives.
7. Invite resource persons with experience in the innovative use of Information Technology in business to speak on relevant issues.

RESOURCES

- | | |
|--|--|
| Daley, B. | <i>Computers are your Future</i> , New Jersey: Pearson Prentice Hall, 2007. |
| Heathcote, P. | <i>A Level Computing</i> , Letts, London: Letts, 2005. |
| Long, L. and Long, N. | <i>Computers: Information Technology in Perspective</i> , New Jersey: Prentice Hall, 2004. |
| Parson, J. and Oja, D. | <i>Computer Concepts</i> , New York: International Thompson Publishing Company, 2007. |
| Shelly, G., Cashman, T., and Vermaat, M. | <i>Discovering Computers</i> , New York: International Thompson Publishing Company, 2008. |

UNIT 1

MODULE 3: INFORMATION AND PROBLEM-SOLVING

GENERAL OBJECTIVES

On completion of this Module, students should:

1. develop the knowledge, skills and understanding of the problem-solving process;
2. develop an appreciation for the value and importance of information to solve problems.

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

- | | |
|--|--|
| 1. explain the concept of problem-solving; | Problem-solving as a process; finding solutions to a problem. |
| 2. describe the stages of the problem-solving process; | Stages: including define the problem, analyze the problem (using tools, such as questionnaires, interviews, observation, reviewing documents), identify and evaluate possible solutions, select and justify the optimal solution, implement, and review. |
| 3. describe the role of information in the solution of real-life problems; | Identification of the information necessary for the solution of personal, commercial, scientific and social problems. Categorization of information as essential, desirable, extraneous or cosmetic in the solution of a problem. |
| 4. explain how information can be used to solve real-life problems; | Criteria for rejecting or accepting a piece of information, including bias, accuracy, cultural context, completeness, currency of information, refereed and unrefereed sources, characteristics of information on the Internet. |
| 5. analyse the role of information in fulfilling the goals of an individual or organization; | Information used in decision-making and problem-solving; capitalising on opportunities. |
| 6. describe data flow diagrams (DFD); | Define DFD; identify and describe the four symbols (elements); entity, process, data store, data flow; identify and describe the various levels of DFDs including context level and first level detailed DFD. |
| 7. explain the concept of an algorithm; | Definition; algorithm as a problem-solving strategy; its role and importance in the problem-solving process; properties of algorithm. |
| 8. identify the necessary properties of 'well designed' algorithms; | Properties including a general solution to the problem in a finite number of steps, clearly defined and unambiguous, flow of control from one process to another. |

UNIT 1

MODULE 3: INFORMATION AND PROBLEM-SOLVING (cont'd)

SPECIFIC OBJECTIVES	CONTENT
<i>Students should be able to:</i>	
9. identify ways of representing algorithms;	Inclusion of narrative, flowcharts and pseudocode.
10. develop algorithms to represent problem solution;	Simple input, output, processing; control structures: sequence, selection, looping and iteration.
11. explain the concept of programming;	Development of computer programs; stages in programme development; programming paradigms; examples of programming languages.
12. outline the interrelationship(s) between algorithms and programming.	Algorithms as precursor to program development.

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Module, teachers are advised to engage students in the teaching and learning activities listed below.

1. Conduct discussion leading to the definition of a problem to ascertain the students' perspectives of the problem. Give feedback on the perspectives by identifying problems in different scenarios. For example, a farmer getting rid of a pest affecting his crop.
2. Emphasis should be placed on the fact that most if not all problems have an information component. For example, the information the farmer would need to get rid of the pest affecting his crop would be the type of pest, what are its natural enemies, what would be the effect on his crop of using a particular pesticide or a natural enemy of the pest.
3. Visit business places to observe how Information Technology is used to address problems faced by the organisation.
4. Invite professionals, artists, and others to make presentations to students to give additional perspectives on issues relevant to their studies. Encourage students to make presentations to persons outside of the school system, who can evaluate a comment on the presentations as well as answer the students' questions.
5. Invite professionals, artists, and others to make presentations to students to give additional perspectives on issues relevant to their studies. Encourage students to make presentations to persons outside of the school system, who can evaluate a comment on the presentations as well as answer the students' questions.

UNIT 1

MODULE 3: INFORMATION AND PROBLEM-SOLVING (cont'd)

6. Choose a physical activity, such as a sport, to demonstrate how the use of information can be an effective tool or mechanism in ensuring a desired outcome, such as improved performance or success over competitors.
7. Develop a set of scenarios in which there are either opportunities or problems encountered by an organization. Students are required to (a) identify a problem, (b) formulate a problem statement, (c) suggest two possible solutions, and (d) recommend one of the solutions and justify the choice.
8. Adopt a single DFD notation style and have students complete several exercises to become familiar with that style, for example, Gane and Sarson. Present data flow diagramming errors and have students label these with the relevant terms. For example, black hole - process with only input data flow, a process with only output data flow from it; data stores or external entities that are connected directly to each other, in any combination; incorrectly labeling data flow or objects, some examples are:
 - (i) labels omitted from data flow or objects;
 - (ii) data flow labeled with a verb;
 - (iii) processes labeled with a noun.
9. Work in groups to address problem-solving through the development of algorithms and the use of pseudocode to solve those problems. This activity should ensure that all elements are practiced.

RESOURCES

- | | |
|--|--|
| Daley, B. | <i>Computers are your Future</i> , New Jersey: Pearson Prentice Hall, 2007. |
| Heathcote, P. | <i>A Level Computing</i> , Letts, London: Letts, 2005. |
| Long, L. and Long, N. | <i>Computers: Information Technology in Perspective</i> , New Jersey: Prentice Hall, 2004. |
| Parson, J. and Oja, D. | <i>Computer Concepts</i> , New York: International Thompson Publishing Company, 2007. |
| Shelly, G., Cashman, T., and Vermaat, M. | <i>Discovering Computers</i> , New York: International Thompson Publishing Company, 2008. |

◆ UNIT 2: APPLICATION AND IMPLICATION

MODULE 1: INFORMATION MANAGEMENT

GENERAL OBJECTIVES

On completion of this Module, students should:

1. acquire the knowledge needed to organise and manage data, making it meaningful to an organization;
2. demonstrate the skills needed to organise and manage data within a database.

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

- | | |
|---|---|
| 1. differentiate among terms used in Information Management; | For example, fields, records, tables, files, database and database management system. |
| 2. explain how files and databases are used in organizations; | Uses: including store, organise, search, retrieve; eliminate redundancies; data mining, data marts and data warehouses. |
| 3. explain how data storage and retrieval have changed over time; | Concept of the terms; history of storage devices; formats of data (from text-based to multimedia); volumes to be stored; compression utilities; access method and speed. |
| 4. explain the advantages of using a database approach compared to using traditional file processing; | Advantages including speed, efficiency, cost; data quality: completeness, validity, consistency, timeliness and accuracy; data handling, data processing. |
| 5. describe the different types and organization of files and databases; | File types including master and transaction files; file organization including serial, sequential, random or direct, indexed sequential database types including personal, workgroup, department and enterprise databases; database organization including hierarchical, relational, network and object-oriented. |
| 6. use data flow diagrams (DFD) to document the flow of information within an organization; | Use of symbols for data stores, processing, data flow and external entities; context level DFD and first level detailed DFD; Use of symbols, context level DFD and first level detailed DFD to illustrate the information flow. |

UNIT 2

MODULE 1: INFORMATION MANAGEMENT (cont'd)

SPECIFIC OBJECTIVES	CONTENT
Students should be able to:	
7. explain how the growth of the Internet impact on data handling and data processing;	Including the demands for information (by customers and suppliers); data mining, data warehousing; interfacing websites to underlying databases.
8. explain how the absence of data quality, accuracy, and timeliness will impact on organizations;	Including loss of revenue, sales, competitive advantage, customers; poor decision-making; missed opportunities; impact on problem solutions.
9. explain the concept of normalisation;	Definition of normalisation; attribute redundancy and anomalies; normal forms: including first normal form (1NF), second normal form (2NF), third normal form (3NF); keys: primary, foreign and composite (or compound or concatenated); partial and non-key dependencies; relationships, use of entity-relationship diagrams (ERD).
10. apply normalisation rules to remove normal form violations;	To 1NF, 2NF and 3NF; removal of attribute redundancy and anomalies, such as repeating groups of data (or attributes), partial and non-key dependencies.
11. explain how normal for relations impact databases;	Including improve performance, data consistency, data integrity.
12. construct a database.	Including forms; reports, queries, tables, tuples, relationship links, enforcing referential integrity, updates or deletions, use of foreign keys, use of macros, SQL, data validation and verification strategies; used to analyse data and provide multiple viewing and reporting of data.

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Module, teachers are advised to engage students in the teaching and learning activities listed below.

1. Choose a single scenario to which students can easily relate, such as a library system or student registration system, and use it throughout the Module to develop understanding of the specified concepts and techniques.

UNIT 2

MODULE 1: INFORMATION MANAGEMENT (cont'd)

2. Ask students to complete several exercises on the normalisation process involving the use of standard notations to remove normal form violations.
3. Compile a glossary of terms using the Internet, computer magazines, textbooks and other information sources. This could form the basis of an in-class discussion.
4. Students should design and construct a database.
5. Develop and use diagrams to represent the concepts and relationships contained in the Specific Objectives.

RESOURCES

Daley, B.	<i>Computers are your Future</i> , New Jersey: Pearson Prentice Hall, 2007.
Heathcote, P.	<i>A Level Computing</i> , Letts, London: Letts, 2005.
Long, L. and Long, N.	<i>Computers: Information Technology in Perspective</i> , New Jersey: Prentice Hall, 2004.
Parson, J. and Oja, D.	<i>Computer Concepts</i> , New York: International Thompson Publishing Company, 2007.
Shelly, G., Cashman, T., and Vermaat, M.	<i>Discovering Computers</i> , New York: International Thompson Publishing Company, 2008.

UNIT 2

MODULE 2: USE OF INFORMATION TECHNOLOGY TOOLS

GENERAL OBJECTIVES

On completion of this Module, students should:

1. develop confidence in selecting and using productivity tools to solve real-life problems;
2. use their knowledge and understanding of a variety of software tools and apply their use to various situations;
3. develop the competence to present information in the appropriate manner;
4. use information critically;
5. develop an awareness of emerging technologies.

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

- | | |
|---|--|
| 1. explain reasons for the use of IT tools; | Enhanced speed, accuracy, reliability, efficiency, flexibility, communication, presentation of information, integration of processes, decision making; storage and retrieval of large volumes of data; manageability of task; pressures from clients, competitors and suppliers. |
| 2. explain the functions and uses of the major types of software tools; | Examples of different types of software packages and their function and uses. Including Financial Packages, Software Development Tools, Statistical Tools, Word Processors, Spreadsheets, Presentation Tools, and Database Management Tools, Desktop publishing, graphics and personal information management. |
| 3. explain where a word processing tool is appropriate; | Main purpose and uses; significant features of the tool. |
| 4. explain where a spreadsheet tool is appropriate; | Main purpose and uses; significant features of the tool. |
| 5. explain where a presentation tool is appropriate; | Main purpose and uses; significant features of the tool. |
| 6. explain where a database management system tool is appropriate; | Main purpose and uses; significant features of the tool. |

UNIT 2

MODULE 2: USE OF INFORMATION TECHNOLOGY TOOLS (cont'd)

SPECIFIC OBJECTIVES	CONTENT
<i>Students should be able to:</i>	
7. use IT tools to solve real-life problems;	Including hardware, application software, and communication tools; main purpose and uses of tool; significant features of the tool.
8. justify the use of IT tools to solve real-life problems;	Criteria for selection including the nature of the solution, type of analysis required (calculations, formatting, graphing), type of data, type of storage, type of access method, type of processing, type of reports (detailed, summary, preformatted, ad hoc).
9. use the most appropriate format to display or present information;	Format including text, graphics, sound, video, graphs, charts and tables.
10. use appropriate information sources to retrieve and disseminate information for a particular task;	Criteria for selection, appropriateness for task, types of information sources: including books, journals, catalogs, magazines, newspapers, online libraries, CD-ROMs, DVDs, electronic databases, web sites, and people.
11. justify the acceptance or rejection of a piece of information;	Based on critical evaluation of information sources; criteria including authority, publishing body, bias or objectivity, currency, reference to other sources, relevance and coverage (breadth and depth).
12. use information technology tools to access and communicate with remote information sources;	Tools including communication software, browsers, e-mail systems, fax, telephone, pager, computer, word processor, spreadsheet, presentation software, desktop publishing software, Internet: interactive on-line services; telnet, ftp, newsgroups, message board, mailing list, Internet telephony.
13. construct web pages;	Design, code, construct web pages using HTML, authoring tools; hyperlinks.
14. discuss types of web pages;	Including portal, news, blog, wiki, informational, business, marketing.
15. explain how an emerging technology can be used for a particular task.	Including alternative input/output devices; alternative displays; intelligent appliances; mobile computing and wearable computing.

UNIT 2

MODULE 2: USE OF INFORMATION TECHNOLOGY TOOLS (cont'd)

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Module, teachers are advised to engage students in the teaching and learning activities listed below.

1. Compile a glossary of terms using the Internet, computer magazines, textbooks and other information sources. This could form the basis of an in-class discussion.
2. Identify a software package to research. The student or group may demonstrate one feature of software to the whole class using audio-visual aids. Special attention should be paid to features that make the software uniquely suited to the given task.
3. Apprise students of presentation packages like PowerPoint and encourage them to use appropriate packages in their presentation. Invite persons knowledgeable in presentation skills to critique the presentations.

RESOURCES

- | | |
|--|--|
| Daley, B. | <i>Computers are your Future</i> , New Jersey: Pearson Prentice Hall, 2007. |
| Heathcote, P. | <i>A Level Computing</i> , Letts, London: Letts, 2005. |
| Long, L. and Long, N. | <i>Computers: Information Technology in Perspective</i> , New Jersey: Prentice Hall, 2004. |
| Parson, J. and Oja, D. | <i>Computer Concepts</i> , New York: International Thompson Publishing Company, 2007. |
| Shelly, G., Cashman, T., and Vermaat, M. | <i>Discovering Computers</i> , New York: International Thompson Publishing Company, 2008. |

UNIT 2

MODULE 3: SOCIAL, ORGANIZATIONAL AND PERSONAL ISSUES

GENERAL OBJECTIVE

On completion of this Module, students should develop an understanding of the power and potential pitfalls of Information Technology.

SPECIFIC OBJECTIVES

CONTENT

Students should be able to:

1. describe ways in which Information Technology impacts the society;

Ways including modes of interaction between people; telecommuting; online shopping; gaming; gender and diversity related issues; impact of automation of existing processes; process innovation; need for information policies and strategies within organizations and the nation; emergence of new organizations (virtual organizations); knowledge management; impact on job skills, job opportunities, retraining, privacy, surveillance, security, commercial transactions, entertainment, culture, economy and economic opportunities, politics; e-commerce and e-business, e-governance, e-learning, e-surgery; copyright, intellectual property rights; proprietary data and software; computer crimes; litigation; technology transfer; cultural biases; trade agreements, legislation; taxation.
2. discuss various computer crimes;

Including propaganda; computer fraud, industrial sabotage; computer viruses; malware, electronic eavesdropping; cyber terrorism, hacking; identity theft, spoofing, phishing, hardware theft and vandalism, piracy, information theft, spam.
3. explain how Information Technology System components can be threats, vulnerabilities, countermeasures, attacks and compromises to organizations;

For example, threats posed by the Internet, such as by providing access to the Internet to employees the organization is exposed to lawsuits, viruses and hacking; encryption as a two-edged sword; difficulties experienced by organisations in the disposal of obsolete equipment.
4. describe legal and ethical considerations related to the handling and management of enterprise information assets;

Including laws, policies, procedures, guidelines; the misuse of information, such as manipulation of information to give false representations, identity theft; invasion of privacy; phishing, pharming.

UNIT 2

MODULE 3: SOCIAL, ORGANIZATIONAL AND PERSONAL ISSUES (cont'd)

SPECIFIC OBJECTIVES	CONTENT
<i>Students should be able to:</i>	
5. explain the risks or threats associated with disasters or disruptions;	Risks associated with natural disasters and other hazards, such as hurricanes, flooding, earthquakes, volcanic eruptions, fires, riots, strikes, acts of terrorism. Risks associated with disruptions including power outages, spikes or surges.
6. examine various other computer security, health and safety, and environmental risks and threats;	<p>Computer security risks including Internet and network attacks, unauthorised access and use; hardware theft and vandalism; software and information theft, system failure: defective devices (electromechanical problems), software glitches or bugs.</p> <p>Health and safety risks including repetitive strain injury, carpal tunnel syndrome, computer vision syndrome, computer addiction.</p> <p>Environmental risks including energy consumption, environmental pollution, such as disposal of obsolete computer equipment and storage media.</p>
7. specify key mitigation strategies (mechanisms and measures) to counter risks;	Including disaster recovery plan, backup; uninterruptible power supply (UPS); surge protectors, firewalls; authentication: usernames, passwords, possessed objects, biometric devices, encryption; audit trails; transaction logs; intrusion detection software; antivirus software; legislation; company policies; software licensing including agreements, shareware, freeware, site licenses, enterprise licenses and single user licenses; product activation; ergonomics and workplace design; therapy and support groups; green computing.
8. distinguish among copyright, patent, and trademark laws;	Explanation of terms copyright, patent and trademark; differences.
9. explain the implications of plagiarism;	Negative implications of plagiarism.
10. examine the consequences of software piracy;	Including enacting legislations, establishing policies, loss of revenue for developers, software agreements and licenses, product activation.

UNIT 2

MODULE 3: SOCIAL, ORGANIZATIONAL AND PERSONAL ISSUES (cont'd)

SPECIFIC OBJECTIVES	CONTENT
11. distinguish among the different types of malware;	Malware including viruses, Trojan horses and worms.
12. evaluate policies and practices that are relevant to safeguarding an organisation's information assets.	Policies including Internet policies, email policies and practices; security measures.

Suggested Teaching and Learning Activities

To facilitate students' attainment of the objectives of this Module, teachers are advised to engage students in the teaching and learning activities listed below.

1. Make extensive use of the Internet to source material relevant to this Module.
2. Invite resource persons with the relevant expertise to discuss issues relevant to this Module. This is particularly useful for Specific Objectives 3, 4, 6, 9 and 10.
3. Use case studies to demonstrate techniques and concepts.
4. Use concept maps and concept frames to organise and illustrate the interrelationships between various pieces of information.
5. Conduct teacher-guided classroom discussion. Students should be encouraged to discuss and debate the ethical, social, economic, legal and political implications of the use of Information Technology.
6. Obtain brochures from vendors and service providers.

RESOURCES

- Daley, B. *Computers are your Future*, New Jersey: Pearson Prentice Hall, 2007.
- Parson, J. and Oja, D. *Computer Concepts*, New York: International Thompson Publishing Company, 2007.
- Shelly, G., Cashman, T., and Vermaat, M. *Discovering Computers*, New York: International Thompson Publishing Company, 2008.



◆ OUTLINE OF ASSESSMENT

Candidates' performance will be reported as an overall grade and a grade on each Module. The scheme of assessment will comprise two components, one external and one internal.

EXTERNAL ASSESSMENT (80%)

Paper 01 (1 hour 30 minutes) Forty-five multiple-choice items, fifteen (15) from each Module. Each item is worth 1 mark. (30%)

Paper 02 (2 hours 30 minutes) The paper will consist of nine questions, three on each Module. Candidates will be expected to answer all questions. (50%)

SCHOOL-BASED ASSESSMENT (20%)

Paper 03A/03B

This paper is compulsory and consists of a project.

Unit 1: Information Technology Theory

The aim of the project is to develop the candidate's appreciation for and use of the problem-solving process.

Requirements

Each candidate is required to identify and examine a problem in their own environment which requires an Information Technology based solution. The candidate should define the problem, collect data relevant to that problem, identify and examine options and present the selected solution with justification. The candidates should ensure that the selected solution is an Information Technology based solution. The student should produce a report of approximately 1500 words.

Unit 2: Application and Implications

The aim of the project is to provide opportunity for the candidate to demonstrate proficiency in the use of Information Technology tools to solve real-life problems and have an appreciation for the factors that mitigate against and manage risk associated with Information Technology.

Requirements

Each candidate is expected to implement an Information Technology based solution, which should include either a database or a website, to an identified problem in their environment and present that solution using appropriate productivity tools and/or web pages. The project should also include a report of approximately 500-700 words which outlines the problem and addresses any implications which may arise from the implementation of the solution.

MODERATION OF SCHOOL-BASED ASSESSMENT

A School-Based Assessment Record Sheet will be sent each year to schools submitting students for the examinations.

All School-Based Assessment Record Sheets must be submitted to CXC by May 31 of each year of the examination. A sample of assignments will be requested by CXC for moderation purposes. These samples will be re-assessed by CXC Examiners who moderate the School-Based Assessment. Teachers' marks may be adjusted as a result of moderation. The Examiners' comments will be sent to teachers. All School-Based Assessment Record of marks must be submitted online using the SBA Data Capture Module of the Online Registration System (ORS) found on the Council's website www.cxc.org

Copies of the students' submissions must be retained by the school until three months after publication by CXC of the examination results.

ASSESSMENT DETAILS

External Assessment

Paper 01 and Paper 02

The external assessment consists of two written papers. They are externally set and externally assessed. Together they contribute 80% of the final mark.

Paper 01 (1 hour 30 minutes)

1. *Composition of the Paper*

The paper will consist of forty-five (45) multiple-choice items, fifteen (15) from each Module. All questions are compulsory and knowledge of the entire Syllabus is expected. The paper will assess the candidate's knowledge across the breadth of the Syllabus.

2. *Mark Allocation*

The paper is worth 45 marks, with each question being allocated 1 mark.

3. *Question Type*

Questions may be presented using diagrams, data, graphs, prose or other stimulus material.

Paper 02 (2 hours 30 minutes)

1. *Composition of the Paper*

This paper has three sections and consists of nine questions, three on each Module. Candidates are required to answer all questions.

2. Mark Allocation

The paper is worth 150 marks, each module being allocated 50 marks, comprising of two questions being allocated 15 marks each, and one question being allocated 20 marks.

3. Question Type

Each question presents a situation related to a specific topic in the syllabus and consists of three or four sub-questions. The required responses to a sub-question may range in length from one sentence to two paragraphs.

4. Award of marks

Marks will be awarded for knowledge and comprehension, application and analysis and synthesis and evaluation.

School-Based Assessment (20% of Total Assessment)

School-Based Assessment is an integral part of student assessment in the course covered by this syllabus. It is intended to assist students in acquiring certain knowledge, skills and attitudes that are associated with the subject. The activities for the *School-Based* Assessment are linked to the syllabus and should form part of the learning activities to enable the student to achieve the objectives of the syllabus.

During the course of study for the subject, students obtain marks for the competence they develop and demonstrate in undertaking their *School-Based* Assessment assignments. These marks contribute to the final marks and grades that are awarded to students for their performance in the examination.

The guidelines provided in this syllabus for selecting appropriate tasks are intended to assist teachers and students in selecting assignments that are valid for the purpose of *School-Based* Assessment. The guidelines provided for the assessment of these assignments are intended to assist teachers in awarding marks that are reliable estimates of the achievement of students in the *School-Based* Assessment component of the course. In order to ensure that the scores awarded by the teachers are not out of line with the CXC standards, the Council undertakes the moderation of a sample of the *School-Based* Assessment assignments marked by each teacher.

School-Based Assessment provides an opportunity to individualise a part of the curriculum to meet the needs of students. It facilitates feedback to the student at various stages of the experience. This helps to build the self-confidence of students as they proceed with their studies. *School-Based* Assessment also facilitates the development of critical skills and ability emphasised by this CAPE subject and enhances the validity of the examination on which candidate performance is reported. *School-Based* Assessment, therefore, makes a significant and unique contribution to both the development of relevant skills and the testing and rewarding of students for the development of those skills.

The Caribbean Examinations Council seeks to ensure that the *School-Based* Assessment scores are valid and reliable estimates of accomplishment. The guidelines provided in this syllabus are intended to assist in doing so.

Each candidate's total *School-Based Assessment* mark for any Unit should be divided in three and allocated to each Module equally.

Fractional marks should not be awarded. Wherever the Unit mark is not divisible by three, then

- (a) when the remainder is 1 mark, it should be allocated to Module 1
- (b) when the remainder is 2, one of the marks should be allocated to Module 2 and the other mark to Module 3.

1. Integration of Project into the course

- (i) The activities related to Project work should be integrated into the course so as to enable candidates to learn and practise the skills of undertaking a successful project.
- (ii) Some time in class should be allocated for general discussion of project work. For example, discussion of how data should be collected, how data should be analysed and how data should be presented.
- (iii) Class time should also be allocated for discussion between teacher and student, and student and student.

2. Management of Project

i. Planning

An early start to planning project work is highly recommended and the schedule of the dates for submission should be developed by teachers and candidates.

ii. Length

The length of the report of the project should be *between 1500 - 2000 words for Unit 1 and 600 – 700 words for Unit 2* excluding diagrams, graphs, tables and bibliographies.

iii. Guidance

Each candidate should know the requirements of the project and its assessment process.

Although candidates may consult with resource persons besides the teacher the candidates submission should be his or her own work.

Candidates are not expected to work on their own. The teacher is expected to give appropriate guidance at all stages of project work, for example, chapters to read, alternative procedures to follow and other sources of information.

iv. Authenticity

Teachers are required to ensure that all projects are the candidates' work.

A recommended procedure is to:

- (a) engage candidates in discussion;
- (b) ask candidates to describe procedures used and summarise findings either orally or written;
- (c) ask candidates to explain specific aspects of the analysis.

MARK SCHEME FOR SCHOOLBASED ASSESSMENT

UNIT 1

Problem definition	(2 marks)
<ul style="list-style-type: none">• Complete accurate description of the problem• Partial accurate description for the problem	2 marks 1 mark
Ghant chart	(2 marks)
<ul style="list-style-type: none">• Complete - showing all stages from analysis of the problem to justification of solution with realistic times and appropriate use of chart• Partially complete – showing some stages, timelines incomplete or unrealistic with inappropriate use of chart	2 marks 1 mark
Analysis of the problem	(3 marks)
<ul style="list-style-type: none">• Thorough analysis applying at least three appropriate fact finding techniques to establish the major cause or causes of the problem• Thorough analysis applying two appropriate fact finding techniques that identify a cause of the problem• Thorough analysis using one fact finding technique that identifies a cause of the problem	3 marks 2 marks 1 mark
Identification of possible solutions	(2 marks)
<ul style="list-style-type: none">• Identification of TWO or MORE possible solutions• Identification of ONE possible solution	2 marks 1 mark
Evaluation of possible solutions	(3 marks)
<ul style="list-style-type: none">• Complete evaluation of TWO or MORE solutions identified with appropriate treatment of elements such as hardware tools, software tools, other equipment, personnel, cost, and other relevant entities.• Partial evaluation of TWO or MORE solutions identified as it pertains to the treatment of the elements identified above.• Evaluation of ONE solution identified	3 marks 2 marks 1 mark
Solution	(2 marks)
<ul style="list-style-type: none">• Selection of the MOST feasible solution• Selection of a solution	2 marks 1 mark

- Justification of solution** (4 marks)
- Thorough analysis of the issues and appropriate justification of ALL strategies recommended 4 marks
 - Thorough analysis of the issues and appropriate justification of MOST strategies recommended 3 marks
 - Some analysis of a few of the issues and appropriate justification of some strategies 2 marks
 - Appropriate justification of few or partial analysis 1 mark

- Presentation and communication of information** (2 marks)
- Paper is organised and well structured
 - Cover, content page and abstract present and complete
 - Layout of References (MLA or APA)

ALL THREE 2 marks
 ANY TWO 1 mark

(20 marks)

UNIT 2

REPORT:

- Problem definition** (1 mark)
- Complete description of the problem, including description of the background in which the problem occurs 1 mark

- Analysis of the problem** (2 marks)
- Thorough analysis of facts to identify the causes of the problem 2 marks
 - Partial analysis of facts to identify a cause of the problem 1 mark

- Identification and justification of IT tools used in the solution** (2 marks)
- Identification and justification of all appropriate tools 2 marks
 - Identification and justification of some of the appropriate tools 1 mark

- Assessment of the implications of the solution** (3 marks)
- Discussion of various issues that may impact the individual or entity 1 mark
 - Discussion of strategies to address the issues
 - Discussion of ALL strategies to address issues 2 marks
 - Discussion of SOME strategies to address issues 1 mark

SOLUTION:

- Implementation of the IT based solution** (12 marks)
- Appropriate use of IT tools (1 mark)
 - Appropriate use of ALL tools 1 mark

- **Human Computer Interface** (2 marks)
 - Logical and user friendly navigation with appropriate labelling 2 marks
 - Limited navigation available with appropriate labelling 1 mark

 - **Appropriate use of features of tools** (2 marks)
 - Selection and appropriateness of ALL relevant features 2 marks
 - Selection and appropriateness of SOME relevant features 1 mark

 - **Either Working Solution (Database)** (7 marks)

Working solution based on a minimum of THREE entities

 - Solution includes MOST of the relevant tables 1 mark
 - Evidence of appropriate relationships and integrity checks 1 mark
 - Security features included 1 mark
 - MOST features work (Award 1 mark for SOME features work) 2 marks
 - Solution implemented does solve the problem 2 marks

 - **OR Working Solution (Web Site, (minimum of THREE pages))** (7 marks)

Home page (2 marks)

 - Possesses MOST standard features (Logo or banner, Title, Navigation links) 2 marks
 - Possesses SOME standard features 1 mark

Navigational Features (2 marks)

 - MOST features /Links working 2 marks
 - SOME features/Links working 1 mark

Design and layout (3 marks)

 - Appropriate use of font sizes and style 1 mark
 - Appropriate use of colours 1 mark
 - Appropriate use of spacing (readability) 1 mark
- (20 marks)

◆ REGULATIONS FOR PRIVATE CANDIDATES

Candidates who are registered privately will be required to sit Paper 01, Paper 02 and Paper 03B. Paper 03B will test the student's acquisition of the skills in the same areas of the syllabus identified for the *School-Based Assessment*. Consequently, candidates are advised to undertake a project similar to the project that the school candidates would normally complete and submit for *School-Based Assessment*. It should be noted that private candidates would not be required to submit a project document.

◆ REGULATIONS FOR RESIT CANDIDATES

Re-sit candidates must complete Papers 01 and 02 and Paper 03/1 of the examination for the year for which they re-register. Re-sit candidates may elect not to repeat the School-Based Assessment component, provided they re-write the examination no later than two years following their first attempt.

Candidates may opt to complete a School-Based Assessment for each Unit written or may opt to re-use another SBA score which satisfies any of the conditions listed at (a) to (b) below.

- (a) *A candidate who re-writes the examination in the same Unit within two years may re-use the moderated SBA score earned in the previous sitting within the preceding two years. Candidates re-using SBA scores in this way must register as*

“Re-sit candidates” and provide the previous candidate number. Candidates are no longer required to earn a moderated score that is at least 50 per cent of the maximum possible score; any moderated score may be re-used.

- (b) Candidates who enter for Unit 1 or Unit 2, in different sittings, may re-use a moderated SBA score obtained in a previous sitting of either Unit within the preceding two years. The SBA score may be re-used in either Unit, or in both Units, irrespective of the Unit in which it was first obtained. Candidates re-using SBA scores in this way must register as ‘Transfer’ candidates.*

Re-sit candidates must be entered through a recognised educational institution, or the Local Registrar’s Office.

◆ ASSESSMENT GRID

The Assessment Grid contains marks assigned to papers and to Modules and percentage contributions of each paper to total scores.

Papers	Module 1	Module 2	Module 3	Total	(%)
External Assessment					
Paper 01 Multiple Choice (1 hour 30 minutes)	(15)	(15)	(15)	(45)	(30)
Weighting	30	30	30	90	
Paper 02 Essay (2 hours 30 minutes)	50	50	50	150	(50)
School-Based Assessment					
Paper 03A Paper 03B (1 hour 30 minutes)	20	20	20	60	(20)
Total	100	100	100	300	(100)

◆ GLOSSARY

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
analyse	examine in detail	
annotate	add a brief note to a label	Simple phrase or a few words only.
apply	use knowledge/principles to solve problems	Make inferences/conclusions.
assess	present reasons for the importance of particular structures, relationships or processes	Compare the advantages and disadvantages or the merits and demerits of a particular structure, relationship or process.
calculate	arrive at the solution to a numerical problem	Steps should be shown; units must be included.
classify	divide into groups according to observable characteristics	
comment	state opinion or view with supporting reasons	
compare	state similarities and differences	An explanation of the significance of each similarity and difference stated may be required for comparisons which are other than structural.
construct	use a specific format to make and/or draw a graph, histogram, pie chart or other representation using data or material provided or drawn from practical investigations, build (for example, a model), draw scale diagram	Such representations should normally bear a title, appropriate headings and legend.
deduce	make a logical connection between two or more pieces of information; use data to arrive at a conclusion	
define	state concisely the meaning of a word or term	This should include the defining equation/formula where relevant.
demonstrate	show; direct attention to...	
derive	to deduce, determine or extract from data by a set of logical steps some relationship, formula or result	This relationship etc., may be general or specific.
describe	provide detailed factual information of the appearance or arrangement of a specific structure or a sequence of a specific process	Description may be in words, drawings or diagrams or any appropriate combination. Drawings or diagrams should be annotated to

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
		show appropriate detail where necessary.
determine	find the value of a physical quantity	
design	plan and present with appropriate practical detail	Where hypotheses are stated or when tests are to be conducted, possible outcomes should be clearly stated and/or the way in which data will be analyzed and presented.
develop	expand or elaborate an idea or argument with supporting reasons	
diagram	simplified representation showing the relationship between components.	
differentiate/ distinguish (between/ among)	state or explain briefly those differences between or among items which can be used to define the items or place them into separate categories.	
discuss	present reasoned argument; consider points both for and against; explain the relative merits of a case	
draw	make a line representation from specimens or apparatus which shows an accurate relation between the parts	In the case of drawings from specimens, the magnification must always be stated.
estimate	make an approximate quantitative judgement	
evaluate	weigh evidence and make judgements based on given criteria	The use of logical supporting reasons for a particular point of view is more important than the view held; usually both sides of an argument should be considered.
explain	give reasons based on recall; account for	
find	locate a feature or obtain as from a graph	
formulate	devise a hypothesis	
identify	name or point out specific components or features	
illustrate	show clearly by using appropriate examples or diagrams, sketches	
interpret	explain the meaning of	

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
justify	explain the correctness of	
investigate	use simple systematic procedures to observe, record data and draw logical conclusions	
label	add names to identify structures or parts indicated by pointers	
list	itemize without detail	
measure	take accurate quantitative readings using appropriate instruments	
name	give only the name of	No additional information is required.
note	write down observations	
observe	pay attention to details which characterize a specimen, reaction or change taking place; to examine and note scientifically	Observations may involve all the senses and/or extensions of them but would normally exclude the sense of taste.
outline	give basic steps only	
plan	prepare to conduct an investigation	
predict	use information provided to arrive at a likely conclusion or suggest a possible outcome	
record	write an accurate description of the full range of observations made during a given procedure	This includes the values for any variable being investigated; where appropriate, recorded data may be depicted in graphs, histograms or tables.
relate	show connections between; explain how one set of facts or data depend on others or are determined by them	
sketch make	a simple freehand diagram showing relevant proportions and any important details	
state	provide factual information in concise terms outlining explanations	

<u>WORD</u>	<u>DEFINITION/MEANING</u>	<u>NOTES</u>
suggest	offer an explanation deduced from information provided or previous knowledge. (... a hypothesis; provide a generalization which offers a likely explanation for a set of data or observations.)	No correct or incorrect solution is presumed but suggestions must be acceptable within the limits of scientific knowledge.
test	to find out, following set procedures	

Western Zone Office

04/11/2009

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION**

MAY/JUNE 2004

INFORMATION TECHNOLOGY

INFORMATION TECHNOLOGY

CARIBBEAN ADVANCED PROFICIENCY EXAMINATION

MAY/JUNE 2004

GENERAL COMMENTS

The number of candidates sitting this year's examination decreased when compared with the number entered for the examination in 2003. The overall performance of candidates this year was better than 2003. This was apparent in the internal and external examinations.

The quality of the candidates' responses continued to be of major concern to the examiners. Responses, oftentimes, were superficial: lacking depth and reasoning. In addition, some candidates used technical terms inappropriately. For example, pairs of technical terms such as "data and information" and "monitor and screen" were often used interchangeably; however, this ought not to be so in the field of Information Technology. Candidates should be encouraged to have a proper appreciation for technical terms, to know the distinction between certain pairs of technical terms and to use them accurately.

As stated in previous schools' reports, a number of candidates have demonstrated weakness in several areas. For example, candidates were unable to use facts, concepts, principles and procedures in unfamiliar situations, or, to make reasoned judgements and recommendations based on the scenario accompanying questions.

The examiners wish to report that for each question, on both Papers 01 and 02, a few candidates scored full or very high marks. However, there were several candidates who scored zero marks. The examiners would like to encourage schools to pursue the syllabus in an in-depth manner and to ensure that candidates are knowledgeable about a variety of IT tools, both hardware and software, and their applications within the home, school and office.

INTERNAL ASSESSMENT

The examiners noted an overall marked improvement in candidates' performance for all modules.

There were a few candidates who selected technologies that have been around for several decades these cannot be regarded as emerging technologies. The examiners are suggesting that candidates should be encouraged to select technologies that have been introduced within the past three years.

It was also noted that some candidates are depending solely on material obtained from their texts. Examiners propose that technologies covered in recommended texts were unlikely to be considered as emerging technologies, unless these texts were published or reprinted within the last two years.

The examiners have seen reports which indicate that a few candidates were confused about the emerging technology, for example, distinguishing between the device or the phenomenon? In their reports, candidates stated that a device was the emerging technology but then discussed the phenomenon undergirding the device.

There were also reports that dealt with several technologies. The candidates discussed one emerging technology in Section 1 of their report and then a different technology in Section 2. Candidates should be reminded that they are required to research a single emerging technology for Section I and then show the applicability of this technology in the environment, whether their home, school, community or country for Section 2.

Candidates should be reminded that their report should not be more than 2000 words. This approximates to eight, doubled-spaced pages, excluding appendices, table of contents, bibliography, diagrams, tables and graphs.

Several schools submitted the marking schemes for all modules for each candidate in the sample. However, a few schools did not. The examiners wish to encourage these schools to use the marking scheme outlined in the syllabus.

Schools are reminded of the following:

1. All pieces of work, one for EACH module, must be submitted for ALL candidates in the sample that is sent to CXC for moderation.
2. Only the diskettes should be submitted for Module 3. A report for this module is optional. **All diskettes should be virus-free.**

PAPER 01

Section 1 - Information Systems

Question 1

The question was based on candidates' understanding of differences between three concepts: data, information and knowledge, as well as, their understanding of information processing tasks and manual information systems. This question was generally done satisfactorily by most candidates.

For Part (a), most candidates were able to state the difference between data and information, but only a few were able to distinguish between information and knowledge. They understood that knowledge was the ability to use information in decision making or to solve problems. The candidates, who scored full marks, used examples to reinforce the understanding of the differences.

For Part (b), a number of candidates misinterpreted the question and therefore gave responses, such as., "entering customer records into a computer system" or "inputting data". These responses were incorrect. A correct response would be, for example, "weather forecasting where many calculations are done using hundreds of weather data such as air pressure, temperature and humidity.

For Part (c), a number of candidates gave examples of a manual task such as "searching through filing cabinets", " and "marking a register". Others gave examples such as "a filing cabinet of...." suggesting that the filing cabinet is the manual system rather than the collection of records that the filing cabinet contained. Other examples of a manual information processing system are a telephone

directory, an examination timetable, and a catalogue. The responses seemed to suggest that these candidates did not have a proper understanding of information processing systems and, in particular, manual systems.

Question 2

The question was based on candidates' knowledge and understanding of components of information processing systems. The question was poorly done by most candidates.

In Part (a), several candidates were unable to identify two kinds of devices that are used in an automatic A/C system in a motor vehicle. Some candidates gave incorrect responses such as hardware and software.

In Part (b), most candidates could not accurately describe the function of the device. For example, a number of candidates stated that "the sensor was responsible for changing the temperature" within the mini-van. This response was inaccurate. An appropriate response would be "the sensor checks the temperature within the vehicle and relays this data to the central processor which controls the A/C system."

In Part (c), some candidates' responses focused on a description of the features of computer systems within the vehicle and not on the advantage of having such systems. Candidates who scored full marks were able to state that, for example, computer systems were likely to enable a driver to pay attention to the task of driving and thereby reduce the possibility of accidents. Those candidates who scored low marks simply stated that computer systems control devices automatically. They failed to mention how this could be an advantage.

Question 3

The question was designed to test candidates' understanding of the relationship that exists between named hardware components of a computer system. This question was generally satisfactorily done by most candidates.

In Part (a), the candidates, who scored full marks, gave a description of software (what it is) and its purpose (what it is designed to do).

In Part (b), a few candidates ignored two important requirements of the question: (1) draw a BLOCK diagram and (2) SHOW THE RELATIONSHIP between the components. Each component was to be represented by a block, c , and the relationship between pairs of components by an arrow, either α or β . Using a line between components was not sufficient to show the interaction between components.

Question 4

This item examined candidates' ability to identify and discuss appropriate hardware tools to meet a particular need. This question was generally well done by most candidates. Several candidates scored full marks.

Candidates, who scored zero or low marks for Part (b), gave responses, which focused on the uses of the devices rather than on the types of data captured by the named devices. For example, some candidates stated that a scanner is used to scan documents; but a more accurate response would be that a scanner is used to capture text or graphics.

For Part (c), a few candidates discussed a problem that could be viewed as one of a general nature, such as "device being broken" or "users not knowing how to use the device". A more appropriate response would be a problem specific to the data capture device. For example, with a microphone, there could be interference from other sounds in its vicinity; therefore distortion of the data being captured is possible.

Question 5

This question assessed candidates' knowledge and understanding of software engineering process and professional groups that are involved in the process.

This question was poorly done by most candidates. A number of the candidates confused the stages of the software engineering process with those of problem solving. Other candidates, although their responses indicated that they were aware of the software engineer-

ing process, they were unable to identify the major stages or the correct (logical) sequencing of the stages.

In addition, some candidates could not name or gave partial titles of two professional groups involved in the process. Where candidates accurately named the professional groups, they were unable to describe their role in the process.

It was evident that most candidates were not familiar with software engineering process.

Section II - Information Processing and Presentation

Question 6

This question examined candidates' ability to identify and describe the major categories of software tools available to the manager of a company.

For Part (a) a number of candidates did not pose questions that could assist the manager in determining a suitable course of action: whether to buy a software package or to have one developed for his company. For example, responses such as "what are the requirements?" and "who will use the software?", would be asked regardless of the course of action taken. Examples of appropriate questions that could be posed are:

- Is there a suitable "off the shelf" software package available that will meet our requirements?
- Is it relatively free of "bugs"?
- Is it easy to install?
- What is the cost to purchase? To develop/build the software?
- How long will it take to build the software? Can the company afford to wait?

For Part (b), most candidates identified the correct categories of software. However, a few candidates gave “system software” and “application software” as the two major categories of software available to manager. These responses were incorrect as the “buy or build” decision applies only to application software.

Question 7

This question assessed candidates’ ability to justify the use of a particular software tool of an integrated software package for a given task. The question was satisfactorily done by most candidates.

Part (a) was generally well done by most candidates. However, a few candidates simply stated what an integrated software package was and failed to explain the purpose of such a software package.

Part (b) was generally well done by most candidates. Some candidates, however, gave incorrect responses such as “Microsoft” and “Windows”.

Part (c), most candidates scored full marks.

Part (d) was generally poorly done by most candidates. For their responses, these candidates rewrote the statements in Part (c) (i) - (c) (iii). For example, the reason given for the choice of a word processor was the tool could be used “to produce letters”. Candidates, who performed well, identified and explained how a particular feature of the named tool could be used to do the task. For example, “the word processor has a mail merge feature which allowed the user to create a form letter and a list of the names and addresses of its customers. These are then merged to produce personalised letters.”

Question 8

This question tested candidates’ knowledge and understanding of data types, and the importance of data types in constructing databases. This question was poorly done by most candidates.

For Part (a), most candidates responded correctly. A few candidates gave responses such as “MS Excel”, “MS Access” and “graphical

data”. Others were confused and interpreted data types to mean primary and secondary data; terms that are not applicable in Information Technology.

Part (b) posed some difficulty to candidates. Candidates either ignored or misinterpreted the phrase “used for storing data” in the question. Most responses described how the named data types were used for entering data. Also, most responses did not include any example, as was requested.

Part (c) was poorly done by most candidates. It appeared that most candidates did not understand the question. Several candidates wrote responses such as “to act as a back up storage”.

Some attention must be given in the classroom to the data types that could be used in construction of databases.

Question 9

This question assessed candidates’ knowledge and understanding of the use of software tools to develop solution to real-life problems. A few candidates scored full marks while most scored few.

Most candidates seemed to be unaware that simulation software packages can be used to solve problems such as the training of (a) pilots without using expensive aircrafts and (b) doctors to perform complex surgeries without using living human beings, or (c) the testing of new products and techniques to identify harmful outcomes.

Question 10

This question examined candidates’ understanding of the distinction between pairs of technical terms (concepts) as they relate to Information Technology. Most candidates performed at an acceptable level.

Most candidates wrote responses that were similar to those of persons who have not studied Information Technology. For example, the desktop was viewed as “the first area that you see when you turn

on the computer”, or a pointer “is a *device* that is used to select an icon”.

A number of candidates stated that a default value is “a number with a fault” and a report is a “summary of information”.

Some attention must be given, in the classroom, to the definitions of popular concepts within Information Technology.

Section 3 - Information and Communication Skills

Question 11

This question assessed candidates’ understanding of the value and importance of information. The question was done satisfactorily by most students.

In Part (a), most candidates listed the characteristics of information but did not use any arguments to show how these characteristics made information to be a saleable commodity. The candidates, who scored high marks, recognised the following:

- The importance of information to people and organisations: its value and usefulness in decision making and problem solving;
- Its cost: to gather, manipulate and store information;
- It can be packaged and distributed in a variety of formats and on various media for sale.

In Part (b), most candidates accurately identified pieces of relevant information that a person would require to bake a cake. A few candidates listed pieces of information that were identical and therefore were not awarded full marks. For example, a candidate who wrote “a recipe”, “list of ingredients” and “instructions” as three pieces of information scored two rather than full marks since a recipe is the list of ingredients AND the directions (instructions) for preparing the cake.

Question 12

This question was designed to test candidates' knowledge of a tool and associated problems that may arise when constructing web pages. This item was generally poorly done by most candidates.

Most candidates did not know that XML was the abbreviation for eXtensible Markup Language. Some candidates used "extended", "extensive" and "extension" rather than extensible.

Not many candidates were aware of the purpose of this language or the problems that could arise when using particular browsers or versions of browsers to access web pages that contain XML code.

Some attention must be given in the classroom to: the different languages that may be used in constructing web pages, the benefits and limitations of these languages, and problems that may arise in accessing web pages with different browsers and versions.

Question 13

This question examined candidates' ability to critique information sources such as the Internet. This item was generally well done.

However, a few candidates simply listed two reasons to refute the statement for Part (b) and two criteria used to evaluate information found on the Internet for Part (c). These candidates did not provide any argument to justify their stated reasons or criteria.

Candidates should be reminded to pay particular attention to the use of some verbs such as "to give" and "to suggest". For example, when requested to give a reason, and the question is worth two or more marks, the candidate is expected to provide at least one valid argument to justify the reason. To only state the reason is not a sufficient response.

Question 14

The question assessed candidates' understanding of concepts that relate to the Internet.

Most candidates did not state the similarity between the named pair and therefore responded only with regards to the difference.

In their responses, several candidates explained what one item in the pair was and ignored the second item. Candidates should be encouraged to respond as follow:

URL and username are both identifiers. URL is an address that points to a specific resource on the Internet whereas the username is the identifier of a person using the computer system.

Candidates should be encouraged to use terms such as “while”, “but” and “whereas” when responding to questions that require them to discuss or explain the difference between pairs of devices or concepts. Candidates should refrain from writing that one item “is...” and the other “is not.”

Question 15

The question tested candidates’ knowledge of IT tools that may be used to access information remotely. This question was satisfactorily done by a few candidates.

A number of candidates seemed to have ignored the scenario given in this item, in particular, that “*there is no electricity*” and therefore the method to recharge the device would be crucial.

These candidates named a device that was inappropriate for part (a). In addition, the candidates could not state and discuss any benefit of the named device.

Some attention must be given, in the classroom, to both wired and wireless communication devices that may be used to access information remotely.

PAPER 02

Section 1 - Information Systems

Question 1

This question was designed to test candidates' knowledge and understanding of the ethical, legal and other considerations associated with the use of information technology. The question was attempted by fifty-nine percent of the candidates.

Parts (a) to (c) were done satisfactorily by most candidates. A few candidates scored full marks.

Most candidates were able to explain the term "copyright" and two benefits of copyrights to the copyright holder. They were also able to provide valid arguments to show why the manager should not illegally reproduce the software.

A few candidates misinterpreted the question and responded with benefits to the persons or organisations that purchased legal copies of the product rather than to the copyrights holder. Some candidates listed three reasons but provide no arguments to support them.

For Part (d), most candidates did not use the information stated in the scenario. Therefore, their plans were financially infeasible and/or impractical.

Question 2

This question examined candidates' knowledge and understanding of the components of information systems and the impact of technology on organisations. Forty-one percent of the candidates attempted this question. Most candidates performed satisfactorily.

A number of candidates did not use appropriate terminologies such as server, clients, workstations and databases in their responses. Several candidates incorrectly used terminal and computer interchangeably.

In Part (b), most candidates demonstrated an understanding of how a network could facilitate the sharing of devices, e.g., the sharing of

a printer, but could not for the sharing of data. A number of candidates interpreted the sharing of data as the “sending and receiving of files” rather than data that resides in one location (such as, on a server) but is accessible to all permitted users (clients/workstations).

In Part (c), most candidates were knowledgeable regarding problems that could arise when sharing data on a network.

In Part (d), most candidates seemed to be unaware of strategies which could be employed to ensure that a network operates smoothly. The candidates who scored high marks displayed ability to write clear and concise statements dealing with strategies to secure and enhance the performance of each major component of the network - hardware, software and users. For example, their plan included the use of a Network Management Software to monitor the performance of resources on the network and which would issue warnings or report potential problems; to perform preventative maintenance routines; to restrict access to computer resources both physically and logically, etc.

Section 2 - Information Processing and Presentation

Question 3

This question assessed candidates’ understanding of the features and functions of spreadsheets and the ways in which a manager could use this and other software tools to improve the productivity of his company. The item was attempted by eight-five percent of the candidates. Most candidates performed at an acceptable level.

For Part (a), most candidates stated the main purpose of the spreadsheet application – to manipulate numerical data. However, many failed to describe what it is (a grid of cells or, is made up of rows and columns), and its uses (to generate financial reports or schedules, graphs, charts).

For Part (b), most candidates performed satisfactorily. Some candidates misinterpreted the question and discussed the uses of the spreadsheet rather than its features.

For Parts (c) and (d), most candidates seemed to recognise the usefulness of the tools but they failed to carry through with logical arguments to show their usefulness or how productivity would be improved.

Question 4

The question examined candidates' knowledge and understanding of certain concepts as they relate to constructing databases. The question was attempted by fifteen percent of the candidates. Most candidates performed at an acceptable level.

Part (a)(i) and Part (b)(i) were generally done well by most candidates. However, Part (a)(ii) and Part (b)(ii) posed some difficulty. Most candidates identified the key field as CUSTOMER. It seemed that because the word "customer" appeared in several field names, then it was named as the key field. Also, most candidates could not show how the sort key could provide useful information to the company. This demonstrated that, whereas, they could define the terms, key field and sort key, they did not fully understand these concepts and their purposes.

Part (c) was generally poorly done by most candidates. From their responses, it was evident that most candidates were unaware of the guidelines to be used in designing forms. The form was not structured (no title or headings, no logical order of data); no meaningful or self-explanatory labelling; no instructions to assist persons in completing the form; not complete (could not capture all relevant data); no spacing (to avoid cluttering); lack ease of use – no indication of field length or input mask, etc.

Some candidates scored high marks. An example of a good design is as follows:

ABC LIMITED KINGSTON, JAMAICA CUSTOMER ORDER	
ORDER NO: 99999	DATE: __/__/_____
CUSTOMER NO: _____	
CUSTOMER NAME: _____	
CUSTOMER ADDRESS: _____	
ITEM DESCRIPTION QUANTITY UNIT COST EXTENDED PRICE TOTAL	

Part (d) was also generally poorly done by most candidates. Candidates listed advantages, but no attempts were made to support or explain how the advantages were achieved. For example, several candidates stated that automated systems were faster than manual systems but failed to provide arguments to justify this claim.

Section 3 - Information and Communication Skills

Question 5

This question was designed to test the candidates' knowledge and understanding of the Internet as a tool to communicate information. The item was attempted by twenty-three percent of the candidates. Most candidates performed at an acceptable level.

Part (a) was poorly done by most candidates, as they could not define an interactive service.

Part (b) was generally done well by those candidates who performed well in Part (a). Since most candidates could not define an interactive service, they were therefore unable to explain the difference between this and a regular email.

Part (c) was generally done satisfactorily by most candidates. Some candidates failed to discuss each benefit, and simply stated the benefit; for example, the Internet is available on a 24/7 basis. They provided no arguments to show why this could be seen as a benefit.

Part (d) was generally done at an acceptable level by most candidates. Candidates wrote clear and concise statements for each problem. However, as stated in Part (c), most candidates failed to provide arguments to justify why these could be viewed as problems. The solutions to problems lacked depth and analysis.

Question 6

This question was attempted by seventy-seven percent of the candidates. It assessed candidates' understanding of information sources and criteria that could be used to critically evaluate information sources. This question was generally satisfactorily done.

A few candidates, however, scored low marks as they failed to provide arguments to justify their position, or demonstrate how the named criterion would be useful in identifying the most appropriate source for a given task. Some candidates confused the criteria to evaluate information sources with those to evaluate information.

INTERNAL ASSESSMENT

This project enabled candidates to examine the potential uses and issues related to a particular emerging technology, and to determine its applicability to their environment (school, community, country or the Caribbean region). Additionally, it enabled the candidates to demonstrate skills and competencies from each of the three modules.

The candidates who scored high marks used the sub-headings in the marking schemes of the modules to structure and organise their report and web pages; thereby, focusing on the areas that were relevant to the study.

Section 1 - Information Systems

Most candidates performed well. Several candidates submitted very good papers demonstrating that they did substantial information gathering on the emerging technology.

A few candidates failed to show the potential uses of the technology. They have confused the uses with the functions of the emerging technology. The functions of any technology usually determine how persons would use the technology. For example, camera phones in the hands of police officers could be used to apprehend suspected criminals. If a police detective sees someone who/he/she believes to be a suspect, this person's picture could be "snapped" and a search made against a database. If a match is found, then the person could be arrested and taken to jail.

Some candidates only examined the technical implications of the technology. Other implications such as legal, ethical, social and political issues should be considered.

Section 2 - Information Processing and Presentation

Most candidates performed well. Several candidates scored very high or full marks. However, there were a few candidates who performed poorly. These candidates confused data types with those used in Communication Study: primary and secondary data. The data types in Information Technology are as follow:

Text; character; number; date; currency; integer; and so on.

Some candidates did not ask questions that would have assisted them in determining whether the technology was applicable to their environment. Therefore, the data gathered could not support their conclusion.

Section 3 - Information and Communication Skills

In general, candidates demonstrated acceptable skills and competencies. Most candidates performed well. Weaker candidates have failed to summarise the report for their web pages.

Schools are encouraged to look at web sites that are considered to be well designed and aesthetically pleasing, and advise students to use similar style and techniques in creating their own web pages.

Centres are reminded that candidates must submit diskettes. A report for Module 3 is optional.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2005**

INFORMATION TECHNOLOGY

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INFORMATION TECHNOLOGY
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2005

GENERAL COMMENTS

The number of candidates sitting this year's examination increased when compared with the number entered for the examination in 2004. The overall performance for this year was better than 2004. This was true for both the internal and external examinations.

The examiners continue to be concerned about the quality of candidates' responses to questions, especially to questions in which a scenario is described. Too many candidates provided responses that ignored the scenario. In addition, a number of candidates gave responses expected at the CSEC level rather than that at the CAPE level.

Also, several candidates used the functions and features of software interchangeably especially in their responses to questions in Module 2 and Module 3. In addition, some candidates identified the features/functions of software as advantages of software. For example, candidates gave the response 'sending messages' as an advantage of using the email system in an organisation.

The examiners wish to report that for each question, on both Papers 01 and 02, a few candidates scored full or very high marks. However, there were some candidates who attempted questions but failed to score any marks.

The examiners would like to encourage teachers to pursue the syllabus in an in-depth manner and to ensure that candidates are knowledgeable about a variety of IT tools, both hardware and software, and their applications within the home, school and office.

Internal Assessment

The examiners noted an overall marked improvement on candidates' performance.

A number of centres prepared assignments based on outdated guidelines rather than on the amended syllabus. Consequently, there were candidates who produced assignments that included web pages.

Concerning Form IT1-3 (Moderation of Internal Assessment Sample), a significant number of teachers either did not complete the form or completed it incorrectly. Attention should be paid to the calculation of the total marks obtained by each candidate as this may adversely affect the selection of samples submitted for moderation.

In a number of centres, all candidates did the same emerging technology. This

should be discouraged.

Candidates should be reminded that their report should not be more than 2000 words. This approximates to eight , doubled-spaced pages, excluding appendices, table of contents, bibliography, diagrams, tables and graphs. Where the word count is exceeded, a maximum of 10 marks should be deducted from the candidate's score as stated in the guidelines.

PAPER I

Section I - Information Systems

Question 1

The question examined candidates' knowledge of the components (OUTPUT devices) of automated information processing systems and appropriate IT tools to be used in communicating information. This question was generally satisfactorily done by most candidates. Several candidates scored full marks.

A number of candidates ignored the scenario given and therefore their responses to the various parts of the question were inappropriate.

For Part (a)(i), Any three of the following – monitor, printer, plotter, speaker, thermometer – were acceptable.

For Part (a)(ii), several candidates were unable to fully discuss an advantage to the operator of one device when compared with the other named devices. A few candidates viewed the monitor as an interactive device in that when the computer operator makes an error in entering a command, he/she can make the necessary corrective action by retyping the command. These candidates seemed not to be aware that it is not the monitor (an output device) that will allow the operator to make the correction but the keyboard (an input device). It is therefore evident that these candidates do not fully appreciate the differences and relationship between the various components of the automated information processing system.

A correct response could be “The rate of transmission of information to a monitor is faster (1 mark) when compared with the transmission of information to a printer (1 mark). This will allow the operator to react/respond quickly in the event of an emergency (1 mark)”.

For Part (b), a number of candidates did not state the type of information that named devices produced – text or graphic or sound; temporary or permanent; hard or soft copy of information. A correct response for a plotter could be “A permanent record of graphical output (1 mark) such as the temperature of the plant over the past 12 hours (1 mark)”.

Question 2

The question assessed candidates' knowledge and understanding of the impact of information technology and the spread of viruses on the society. The question was generally well done by most candidates. Several candidates scored full marks.

In part (a), most candidates were able to partially define a computer virus. Many responses described the computer virus as a 'virus' or 'thing' rather than a 'computer program'. To obtain the three marks, the candidate's response should include the following:

What it is – 1 mark
 What it does – 1 mark
 How it does it – 1 mark.

For example, "A virus is a software program (1 mark) that overwrites or attaches itself to other software or electronic documents (1 mark), causing damage such as destroying or corrupting data or deleting the contents of the hard drive (1 mark)."

In part (b), most candidates provided correct responses.

In part (c), many candidates listed the actions to be done when checking and removing computer viruses, however, most failed to properly sequence these actions. The question spoke of an approach, which is an indication that the sequencing of steps was required in their response.

Question 3

The question was designed to test candidates' understanding of issues related to telecommunications and emerging technologies. This question was generally well done by most candidates. A few candidates scored full marks.

For part (a), most candidates performed well.

For part (b), a number of candidates named the 'telephone' as a hardware item that is required for telecommuting, when what is really required was the 'telephone line'. Some candidates include database and spreadsheet software in their responses which meant that they ignored the scenario given – the editing of books and communicating with authors. Appropriate software should be DTP, word processing and email.

For part (c), some candidates either simply stated the advantage or provided a reasoning that did not support the advantage.

Question 4

This item examined candidates' knowledge of one type of information processing systems – Expert Systems. This question was generally poorly done by most candidates.

Most candidates gave responses which applied to expert systems in general rather than as it relates to MYCIN and doctors.

For part (a), a correct response was “An expert system is a set of interactive or question-and-answer computer programs (1 mark) based on a set of rules developed by experienced doctors (1 mark) that help inexperienced or junior doctors (1 mark) to diagnose infectious diseases and identify treatments (1 mark).”

For part (b), some usefulness to doctors are:

- Inexperience or junior doctors may use MYCIN to provide treatments for infectious diseases without having to refer their patients to specialist.
- Infectious diseases that can be fatal if not treated immediately can be quickly identified and the proper treatment dispensed.
- Training of student doctors can be fast-tracked in the area of infectious diseases and treatments. Without MYCIN, the training could take several years.

Some candidates confused expert systems with simulation programs and as such responded that MYCIN could be used for training student doctors in performing operations. Both types of system are grouped under Artificial Intelligence, but they are not the same.

Question 5

This question assessed candidates’ knowledge and understanding of uses of and the impact of information technology on organisations.

This question was generally well done by most candidates. Several candidates scored full marks. A few candidates, however, for part (a), ignored the scenario given and therefore their responses reflected a changeover from a manual system to an automated information processing system. For part (b), some candidates discussed problems that could arise prior to the changeover, rather than after the changeover to new hardware and software as the question required.

Section II - Information Processing and Presentation

Question 6

This question examined candidates’ ability to identify the category that a software tool belongs to, and to explain the purposes of the tool. The question was satisfactorily done by most students. A few students scored full marks.

For part (a) a number of candidates gave responses that spoke of the features of the tool rather than the purposes or functions of the tool. Responses such as “copy and paste” and “header and footer” are features of the tool. A more appropriate response, for example, would be “A spreadsheet allows the user to store numeric data in columns and rows, arranged in a grid, to facilitate calculations speedily.”

For part (b), most candidates identified the correct category to which the software belonged. However, many of them could not justify their response.

Question 7

The question assessed candidates' knowledge and understanding of the stages of problem solving, its importance in the successful implementation of solution, as well as, the appropriate level of presentation of information to users. A few candidates scored full marks while most did poorly.

Part (a) was generally well done by most candidates. However, a few candidates confused the problem-solving process with the software engineering process. the purpose of such a software package.

Part (b) was generally poorly done by most candidates. The candidates were unable to state valid reasons why the stages such as problem definition, analysis, identification and evaluation of solutions should be completed prior to the implementation of any solution. Valid reasons included, but not limited to, the following:

- To determine the problem to be solved;
- To identify the objectives of the solution;
- To document the detailed requirements of the solution;
- To examine options that are available for solving the problem;
- To ensure that the company will not implement a solution that will not solve the problem.

Part (c) was generally poorly done by most candidates as they misinterpreted the meaning of the level of presentation of information to be graphical or textual. The level of presentation of information refers to how information is formatted and presentation at the various level of management within an organisation, that is, operational, tactical or strategic.

Question 8

The question assessed candidates' ability to select and justify the use of software tools to solve real-life problems. This question was satisfactorily done by most candidates. A few candidates scored full marks.

For part (a), most candidates responded correctly. A few candidates, however, gave unacceptable responses such as "general purpose software", "specialised software" and "application software". These are categories of software and not software packages.

For part (b)(i), a number of candidates listed features rather than the functions of the multimedia presentation package. Two functions of the package are:

- To create slide shows, and
- To create animated presentations

For part (b)(ii), most candidates simply stated the advantage rather than provide a discourse on the advantage.

Part (c) was poorly done by most candidates. It appeared that most candidates did not understand the question. Several candidates wrote responses such as “to act as a back up storage”.

Some attention must be given in the classroom to the data types that could be used in construction of databases.

Question 9

This question assessed candidates’ ability to select the most appropriate format to present information to a target audience. Most candidates performed at an acceptable level. A few candidates scored full marks.

A number of candidates seemed to be unaware of the various formats that can be used to present information/data to different groups. Some candidates gave responses such as “query” and “report” as formats that could be used by principal in presenting the findings on students’ performance to the board. These are inappropriate responses. Examples of the format that could be used are tables, charts, graphs, and text (free format).

Question 10

The question examined candidates’ understanding of productivity tools that can be used to develop solution to real life problems. This question was poorly done by most candidates.

For part (a), most candidates responded correctly. A few candidates, however, gave incorrect responses such as “general purpose software”, “specialised software” and “application software”. Other candidates wrote “spreadsheet” and “database management system” rather than naming a specific software package - Excel, Lotus 123, Access or FoxPro. Spreadsheets and DBMS are types/categories of software packages.

For part (b), most candidates ignored the scenario and therefore some of the features described could not assist Mr. Jones in finding a solution to his problem. Some candidates described functions rather than features. One feature of the named spreadsheet (e.g. Excel) that would be beneficial to Mr. Jones is the grid that is a set of rows and columns: a row which is a horizontal group of cells to store all relevant data for each members and a column which is a vertical set of cells to store a specific attribute of each member.

For part (c), most candidates performed poorly. They were unable to accurately list and sequence the steps required to add new data fields to existing records.

Section III - Information and Communication Skills

Question 11

This question assessed candidates' knowledge and understanding of pairs of terms that are related to the Internet. The question was generally done satisfactorily by most students. A number of candidates scored full marks.

In part (a), some candidates simply stated what the abbreviations stood for rather than distinguishing between the pair – HTML and URL.

In part (b), a few candidates wrote the web authoring tool was “some thing that is used to identify the author of a web page while browsing the ‘Net.’”

In part (d), some candidates responded that the logon name was “a unique part of an email address which the may use to connect to a mail server.”

It was evident that a number of candidates did not know the features of and the Information Technology tools themselves that are widely used or commonly associated with the Internet.

Question 12

This question was designed to assess candidates' knowledge of the characteristics of information in the decision-making process. This item was generally satisfactorily done by most candidates. A number of candidates scored full marks.

Most candidates were able to identify the characteristics of information but had difficulties explaining them and citing appropriate examples to demonstrate how these characteristics are important to the decision-making process. Some candidates identified characteristics of information sources such as unbiased and refereed as characteristics of the information itself. Candidates should be made aware that although some characteristics of information sources are applicable to information, there are others which are not applicable.

A few candidates mentioned that collating, analysing and presenting are characteristics of information. This is not so.

Question 13

This question examined candidates' ability to identify pieces of information, and information sources that could be used in solving a problem facing an organisation. This item was generally poorly done by most candidates. A number of candidates scored full marks.

In part (a), most candidates correctly identified two pieces of information that the firm needed to help determine the feasibility of establishing a centre at a particular location. However, a few candidates gave responses that were irrelevant as they ignored the given scenario.

In part (b), for some candidates, the sources of information were confused with the tools used to gather information such as interviews, questionnaires and surveys.

In part (c), most candidates were unable to discuss a problem associated with the information sources identified in part (b).

Question 14

The question assessed candidates' knowledge and understanding of tools that could be used to access information remotely. This question was generally satisfactorily done by most candidates. A few candidates scored full marks.

For part (a), a number of candidates described situations which did not address how the information could be accessed from a remote site. Examples of appropriate response are as follow:

(a) Using a computer:

Dr Young, a local cardiologist, visited the website of a major pharmaceutical company in Europe (1 mark) to obtain information on a new approved drug for heart patients (1 mark).

(b) Using a telephone:

Prior to the doctor's round, Sister Jackson contacted the Government Laboratory, situated in the Capital (1 mark), to get the results of the blood test for a patient (1 mark).

A few responses dealt with using the computer to store large amounts of data or accessing information quickly rather than with how a person could use the computer to access information from a remote site.

For part (b), most candidates were able to discuss one problem adequately but not both. A few candidates simply stated the problems, for example, noise interference when using the telephone but failed to show how this problem affected the transmission/ quality of the information being transmitted.

Question 15

The question assessed candidates' knowledge of the Email System as a tool used to communicate information. This question was generally poorly done by a few candidates. A few candidates scored full marks.

Most candidates confused features with functions. Candidates were required to list uses of the email system such as sending messages to one or more persons, sending one or multiple attachments with a message, sending confirmation when message is received, storing received and sent messages for lengthy periods, etc.

For advantages, a number of candidates stated the advantages of the tool, for

example, send messages quickly. However, these candidates did not state which tool the comparison was being made with and did not provide any explanation as to why this was considered an advantage.

PAPER II

Section I - Information Systems

Question 1

This question was designed to assess candidates' knowledge and understanding of the use of data flow diagrams (DFDs) to document the flow of information within an organisation. The question was attempted by approximately thirty percent of the candidates and was generally poorly done by most candidates. A few candidates scored full marks.

In parts (a) - (b), most candidates performed satisfactorily.

In part (c), most candidates were unable to correctly identify (extract) major processes from the list of activities provided with the question. In the table below are some suggested processes, along with the justification for each process.

Activity	Process(es) & Justification
Organisations telephone the company requesting TEMPS to fill specific positions. These requests update the Request file. If the organization requesting a temporary employee is not on the Employer file, a record is created for the entity.	<p>ADD NEW REQUEST - to process new requests for temporary employees (from organisations)</p> <p>ADD NEW ORGANISATION – to add new organisations to the database</p>
A TEMP is selected to fill the temporary position based on qualification and availability. The Employee and Request files are used to identify the suitable candidate.	FIND SUITABLE TEMPORARY – to select the most suitable candidate from the database to fill temporary vacancy
A contract is sent to the selected candidate. Information is printed from the Employee, Request and Employer files.	PRINT TEMPORARY CONTRACT – to print the contract to send to selected candidate
The returned contract is used to update the Employee and Request files.	<p>PROCESS RETURNED CONTRACT – to process returned contract so as to update the relevant files</p> <p>UPDATE EMPLOYEE or REQUEST FILE - to update the appropriate record on the file</p>
Notification is sent to the organization requesting the TEMP to confirm the date and qualifications, as well as, name.	PRINT EMPLOYER NOTIFICATION – to print letter to notify organisation of temporary secretary’s information and so on.

A few candidates confused the sub-processes (collecting, collating, analysing, presenting and disseminating) of the manual information process (refer to Syllabus) and the stages of the software engineering process with the processes as they relate to the flow of information within a system or organisation, for example, as outlined in the table above. However, what was surprising was the fact that a few of these candidates were able to produce a DFD with valid processes. For these candidates, they seem to be unaware of the link between the processes identified in part (i) with the DFD in part (ii). Teachers are encouraged to use similar approaches to this ques-

tion to demonstrate how DFDs can be developed from the activities done in an organisation.

In drawing the diagrams, a number of candidates ignored the rules or guidelines associated with developing DFDs. In some instances, the wrong symbols were used; the correct naming convention for symbols was not followed; there were no arrowheads to indicate the direction of the information flow; processes were not numbered to show the sequencing of the processes; and arrows were not labelled. To obtain high or full marks, the candidates were expected to:

- Use the correct symbols for entities, processes, data stores and data flows.
- Label all symbols appropriately based on naming conventions.
- Number each process to reflect the overall flow of information.
- Identify the major processes, data stores, data flows and entities from the scenario.
- Develop the DFD based on rules and guidelines.

Question 2

This question examined candidates' knowledge and understanding of the legal and ethical issues that could arise from the use of information technology within organisations and the wider society. Approximately seventy percent of the candidates attempted this question. Most candidates performed satisfactorily.

Parts (a)(i) and (a)(ii) were poorly answered. A number of candidates viewed privacy from the generally accepted interpretation referring, for example, to (not a quote) "people not being able to peep while you were dressing". One candidate wrote that, "Privacy is the safe feeling of secrecy and space of an individual that is provided by others". A few candidates confused privacy with security of data, that is, not allowing unauthorised access to data. While most candidates attempted a response for privacy, a large number had not response for proprietary software.

Two acceptable responses were

- Privacy is the right of individuals (1 mark) not to reveal personal data such as financial status, medical details and current salary (1 mark) about themselves or to have it revealed by others (1 mark).
- Proprietary software is one for which the rights (1 mark) are owned by an individual or a company (1 mark) and it cannot legally be copied, sold or used without permission (1 mark).

For part (b), most candidates were able to state two reasons why a company might want to read its employees' email or monitor their use of the Internet, however, they could not adequately articulate any argument or explanation to justify their position to obtain full marks.

Part (c)(i) posed a challenge for some candidates. These candidates failed to properly name the computer crime and more so to show the link of the crime to the computer. There was much repetition and intermingling of crimes in the discussion of a SINGLE crime. For example, in discussing hacking, the candidate may speak about hacking, computer fraud, the spreading of virus, stealing of data from someone's machine, etc. This seems to suggest that many candidates did not have a clear understanding of a particular computer crime. A few candidates wrote that the downloading of copyrighted material was a crime but this is not necessarily so, especially if the person has paid for the electronic material. It should be noted that some candidates wrote about crimes that existed prior to the advent of computers, for example child pornography and identity theft. Although, the Internet easily facilitates such crimes, they are not viewed as computer crimes.

For part (c)(ii), most candidates did well in relating a safeguard to a crime, however, a few suggested strategies which themselves were computer crimes, for example, "placing a virus on the hacker's system to damage or destroy their hard drive".

Teachers are encouraged to use sites such as www.answers.com and www.whatis.com to get additional information on computer crimes.

Section II - Information Processing and Presentation

Question 3

This question assessed

- (i) candidates' ability to solve real-life problems using IT productivity tools, in particular, a database management system, and
- (ii) their knowledge of its advantages when compared with the spreadsheet.

The item was attempted by fifty-six percent of the candidates. Most candidates performed poorly. No candidate scored more than 24 marks.

For parts (a) and (b)(i), based on their response, it would appear that most candidates were not aware of the guidelines/rules concerning the design of forms and table in database management systems. Marks were awarded for the following:

Registration form to include:

- Appropriate heading (e.g. MILO SCHOOL GIRLS' FOOTBALL LEAGUE, etc);
- Consistent use of formatting (e.g. for dates – DD/MM/YYYY, Spacing, etc);
- Instructions (e.g. Please complete using BLOCK LETTERS, etc);
- Indication of the maximum length for each data field (e.g. use of boxes or lines);
- Names for all data fields (e.g. NAME, DATE OF BIRTH, ADDRESS, TELEPHONE, SCHOOL)
- Spitting name and address (e.g. FIRST NAME, MIDDLE NAME AND LAST NAME; ADDRESS1 and ADDRESS2)

SCHOOL table to include

- Contains data fields including School, Address, Telephone, Coach,
- Games_Won, Games_Lost, Games_Drawn, Games_Played
- Appropriate data types
- Appropriate data lengths
- Appropriate input mask for telephone
- Existence of key identifier (e.g. School or School_Id)
- Validation for fields such as School
- Use of arithmetic expression to validate number of games played, that is, $\text{Games_Played} = \text{Games_Won} + \text{Games_Lost} + \text{Games_Drawn}$

For part (b)(ii), only a few candidates provided the appropriate response, recognising that both tables, PLAYER and SCHOOL, had to have a common data field (SCHOOL or SCHOOL ID), that is, a relationship must exist between the tables.

For part (c), most candidates lost marks as they ignored the scenario and as such provided advantages unrelated to the storing of the data (the details of the teams and players) in a database management system rather than in a spreadsheet.

Question 4

The question examined candidates' knowledge and understanding of features of the spreadsheet that will allow them to solve a problem. The item was attempted by forty-four percent of the candidates. Most candidates performed poorly. Except for one candidate, no one scored 18 marks.

Parts (a) and (b)(i) were generally done well by most candidates. However, for part (a), a few candidates identified some features that were inappropriate based on what the teacher wanted to do.

However, part (b)(ii), part (c) and part (d) posed some difficulty. Most candidates were not able to justify their response for part (b)(ii). For part (c), some candidates provided an explanation for a single column rather than for two columns. For part (d), only a few candidates could name a function that would allow the teacher to determine the number of students receiving each grade (e.g. COUNTIF). Others, however, although not naming a function, indicated that they knew what the function ought to do.

Section III - Information and Communication Skills

Question 5

This question was designed to assess the candidates' knowledge and understanding of the issues that may arise from the use of Internet by organisations. The item was attempted by approximately sixty percent of the candidates. This question was generally poorly done by most candidates. A few candidates scored full marks.

For part (a), most candidates listed four benefits but were unable to clearly demonstrate how an organisation would gain from the stated benefits and for part (b), they did not provide any justification why the stated problem would influence management's decision to restrict the use of the Internet.

For part (c), most candidates correctly identified an alternative tool as a communication medium. Most candidates provided limited discussion to justify the tool as a suitable alternative, and many fail to submit any argument regarding an implication of using this alternative.

Question 6

This question was attempted by forty percent of the candidates. It assessed candidates' understanding of information and its importance to the decision-making process. This question was generally well done by most candidates.

A few candidates scored low marks as they provided weak or no arguments to justify their position. For example, as to whether or not a piece of information such as "The country is a democracy with a stable political and economic climate" was essential or cosmetic, a few candidates responded that the piece of information is essential because "it is vital". These candidates failed to show why the particular piece of information was vital to the shareholders. A more appropriate response could be:

This piece of information would help to reassure shareholders that their investment is not at risk either politically if there is a change of government or economically as the country has a stable economic climate.

INTERNAL ASSESSMENT

This project enabled candidates to examine the potential uses and issues related to a particular emerging technology, and to determine its applicability to their environment (school, community, country or the Caribbean region). Additionally, it enabled the candidates to demonstrate skills and competencies from each of three modules.

The candidates who scored high used the marking scheme to structure and organise their report, thereby, focussing on the areas that were relevant to the study.

Most candidates performed well. Several candidates submitted very good papers demonstrating that they did substantial information gathering on the emerging technology.

A few candidates confused data types with data fields. Data types refer to text, numeric, date/time, currency, Boolean, etc whereas data fields refer to the names given to data elements within a table, for example, in a table called student, some data fields could be name, date of birth, gender, address and telephone.

Some candidates had collected and analysed data that has little or no relevance to their study. Also, graphs and tables are included in their reports without any justification for their inclusion.

Several candidates submitted assignments based on topics that are not relevant to Information Technology. For example, some candidates did research on Human Cloning and Genetics, which are both outside the scope/content of the syllabus. Teachers are encouraged to guide candidates in the selection of the emerging technology for study.

A number of candidates selected infrastructural type technologies (for example, GSM) for review but ended up reviewing either a GSM tool (mobile phones) or services available on the GSM platform (text messaging).

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2006**

INFORMATION TECHNOLOGY

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INFORMATION TECHNOLOGY

CARIBBEAN ADVANCED PROFICIENCY EXAMINATION

MAY/JUNE 2006

GENERAL COMMENTS

The number of candidates sitting this year's examination increased when compared with the number entered for the examination in 2005. The overall performance for this year was slightly lower than 2005. This was true for both the Internal and External examinations.

As stated in the reports for previous years' examinations, the examiners continue to be concerned about the quality of candidates' responses to questions. A majority of the candidates have completely ignored the scenarios associated with questions and therefore their responses were unacceptable. In addition, it would appear that most schools are focusing on the low order skills (Knowledge and Comprehension) rather than on the high order skills (Application and Analysis, and, Synthesis and Evaluation). This is evidenced by the low scores on questions use such verbs as explain, justify, evaluate, examine and distinguish.

The examiners have also noted that questions on web pages have proven to be challenging for most candidates. It would appear that, due to the removal of the development of web pages from the Internal Assessment, a number of schools were no longer providing an in-depth coverage on the topic.

The examiners wish to report that for each question, on both Paper 01 and Paper 02, a few candidates scored full or very high marks. However, there were several candidates who have attempted questions but failed to score any marks. The examiners would like to encourage teachers to pursue the syllabus in an in-depth manner and to ensure that candidates are knowledgeable about a variety of IT tools, both hardware and software, and their applications within the home, school and office.

To address the concerns regarding the poor quality of responses to questions, which use such verbs as explain, justify, evaluate, examine and distinguish, teachers are encourage to include more of such questions on internal examination papers and for homework assignments.

Internal Assessment

A number of centres produced assignments based on outdated guidelines rather than on the amended syllabus (available on the Council's website). Consequently, there were candidates whose reports contain screenshots of web pages.

A significant number of candidates selected technologies that have been around for several decades, for example, cellular telephones. Whilst new model of these devices emerge daily, cellular technology have been around since 1947 and as such, any reference to cellular technology as emerging must be in relation to the latest generation of the technology, for example, General Packet Radio Services (GPRS), Enhanced 3G and Edge. Additionally, a few candidates chose technologies that are outside the scope of the syllabus.

The examiners suggest that candidates are encouraged to select technologies that:

- (a) Have emerged within the past 36 months;
- (b) Relate to information systems (hardware, software and telecommunications, whether infrastructure, tools and services).

The examiners have seen reports, which indicate that a few candidates were confused about what really constituted the "emerging technology". For example, some of the candidates began with a discussion on GPRS, but then gave details about a GPRS capable device. There was very little reference to the GPRS facilitated features of the devices.

Schools are reminded of the following:

- Reports should not be more than 2000 words, which approximates to eight (8), doubled-spaced pages, excluding appendices, table of contents, bibliography, diagrams, tables and graphs;
- All required forms (IT1-3, etc) should be completed accurately. The failure to pay attention to the addition of marks on each candidate's assignment could adversely affect the selection of samples submitted for moderation.

PAPER 01

Section I - Information Systems

Question 1

The question examined candidates' knowledge and understanding of the sub-processes of information processing as well as to test their ability to distinguish between data and information, and manual versus automated information processing. The question was generally well done by most candidates. A number of candidates scored full marks.

For Parts (a) and (b), a few candidates could not clearly distinguish between data and information, and manual and automated information processing.

Question 2

The question assessed candidates' knowledge and understanding of the uses and impact of information technology in organisations. The question was generally well done by most candidates. A number of candidates scored full marks.

Candidates, who lost marks in Part (b), could only provide partial discussion for the problems identified. For example, the discussion focussed on training of staff to become familiar with the system. There were no mention about the cost of training to the organisation, the lost of productive hours (revenue) while staff is being trained, etc.

Question 3

The question was designed to test candidates' knowledge and understanding of components of automated information systems and the interaction between two of the components. Most candidates generally did this question satisfactorily. A few of candidates scored full marks.

For Part (a), most candidates seemed to be unaware that the hardware constitutes the "**tangible or physical**" component of an automated information system, that is, that part which can be seen or touched by humans.

For Part (b), many candidates gave correct examples of devices for the three operations selected. A few candidates identified a microphone as a communication device rather than as an input device, and some storage devices as input devices

For Part (c), most candidates categorised primary memory as a processing device. This is incorrect. Primary memory **temporarily holds** programs and data the CPU requires for processing and, therefore, primary memory is a storage device.

For Part (d), most candidates provided poorly drawn diagrams, omitting the use of -directional arrows (or a bi-directional arrow) to show the interaction (relationship) between the processing and storage devices.

Question 4

This item examined candidates' ability to assess two systems/tools with regards to communicating information by identifying drawbacks of one when compared with the other, and proposing a feasible solution for one of the drawbacks. This question was generally poorly done by most candidates. A few of candidates scored full marks.

In Part (a), most candidates could only identify ONE task/situation that email systems cannot replace when compared with a post office, for example, the inability of email systems to handle tangible items such as parcels and hard currency or to deliver original documentation on which hand-written signatures are required. In addition, a number of candidates overlooked the words "tasks or situations" and simply made a statement, for example, "Email is limited in the number of functions it can do. Post offices can do more."

In Part (b), as a result of the failure to correctly identify a task in Part (a), most candidates performed poorly. A number of candidates, although not identifying a task for Part (a), cited the lack of storage as a reason why email systems could never replace post offices. It should be noted that this constraint is not true for all email systems. Mail servers can store hundreds of gigabytes of messages.

In Part (c), a number of candidates suggested a method, which subsequent to their own arguments, concluded that their response in Part (b) was flawed.

Question 5

This question assessed candidates' knowledge and understanding of the different types of information systems that could be found in a typical organisation, as well as to examine candidates' ability to identify an information system based on a set of characteristics. The question was generally poorly done by most candidates. A few of candidates scored full marks.

Most candidates could neither state which organisational level is the primary user of the named type of information system, nor clearly distinguish between the named information systems. To distinguish between various types of information systems, candidates should focus on the following areas:

- The primary users of the particular system – organisational level (top/executive or senior management, middle management, junior or supervisory management, or staff);
- The type of problems solved by the system – structured, semi-structured, or unstructured problems;
- The type of input into the system – transaction data, processed transactions, other internal data, external data, questions or queries, etc
- The type of output generated by the system – detailed reports, summarised reports, flexible or ad hoc reports, answers.

In Part (c), as most candidates did not know the unique characteristics of each information system, they were unable to correctly identify the type of information system from the descriptions given.

Section II - Information Processing and Presentation

Question 6

This question assessed candidates' knowledge and understanding of the different categories and types of software. The question was satisfactorily done by most candidates. A few of candidates scored full marks.

Part (a) was generally well done by most candidates. However, a few candidates gave responses that suggested that there is a bit of confusion regarding the division of software into categories, for example, providing responses such as "general purpose and operating systems", "specialised and application software", or "general purpose and application software".

Part (b) was generally poorly done by most candidates as they responded with named applications rather than the type of software for example Microsoft Word instead of word processing, MS Excel instead of spreadsheet, etcetera.

Part (c) was generally well done by most candidates. However, a few candidates ignored the fact that they were required to discuss **distinguishing** features and not just any feature of named type of software.

Question 7

The question assessed candidates' ability to examine a situation and identify appropriate software tools that could be used to in providing the solution. Most candidates performed at an acceptable level. A few of candidates scored full marks.

Most candidates were unable to correctly state what "a productivity software tool" was as their response was applicable to any software – "to enhance efficiency and productivity" or "analyst, print or display data". An excellent response from one candidate was as follows:

A productivity software tool is one generally used by any individual and is used to do a variety of tasks.

A number of candidates performed poorly in Part (b) and Part (c). These candidates listed either geographic instruments such as wind or rain gauge, weather vane, seismograph, and Richter scale, or non- productivity software tools such as antivirus, defrag and statistical package. For part (c), there were candidates who correctly identified productivity tools in Part (b), but were unable to clearly demonstrate how the disaster coordinators could use each tool to assist them in the gathering, manipulating or analysis of data, or with the presentation of their findings.

Question 8

The question tested candidates' knowledge and understanding of normalisation, as well as, their ability to examine tables (entities) in standard notation and to state their normal form, with justification. This question was generally poorly done by most candidates. A few of candidates scored full marks.

Based on the poor response, it would appear that most schools did not adequately cover this topic. Most candidates were unaware that "normalisation of data" is a process, which is guided by a set of rules, to ensure that a database is structured in the most efficient manner by eliminating data redundancies and partial dependencies. Some candidates stated that normalisation had to do with data entry, calculation, sorting, problem solving, etcetera. As a result, these candidates were unable to describe two stages of the normalisation process and could not identify or justify the normal form of given entities (tables).

Question 9

This question assessed candidates' ability to select and justify the most appropriate format to present information to a target audience. Most candidates did poorly on this question. A few of candidates scored full marks.

A number of candidates seemed to be unaware of the various formats that can be used to display or present information/data in print to different target groups. Some candidates gave responses such as landscape, portrait, bold, italics, Excel, Word, softcopy, hardcopy, audio, Braille, numbers, etcetera as formats that could be used. These were inappropriate responses. Correct responses include text, tables, graphs, charts, special purpose notations, and graphics.

For Part (b)(i), to display the income and expenditure data for several years, a company could use a table, chart or graph so that its shareholders can view the financial performance of the company at a glance or be able to quickly compare one year's performance against another.

For Part (b)(ii), the architect could use a plan/diagram (graphics) showing the dimensions, layout and position of each room to the Town Planning Department, as the saying goes, “a picture is worth a thousand words.”

It should be noted that a number of candidates provided correct responses to Part (b) despite inappropriate responses for Part (a), suggesting that these candidates did not have an appreciation of the link between the parts and stem of the question.

Question 10

The question examined candidates’ knowledge and understanding of the stages in problem solving and their ability to select the most appropriate software tool and attendant features to solve a real life problem. Most candidates did this question satisfactorily. A few of candidates scored full marks.

Parts (b) and (d) posed some challenge for a number of candidates. For Part (b), the candidates did not provide an explanation for the named stage but rather gave a definition/description of the stage. In providing an appropriate response, the candidate should clearly give a description of the stage and why there is need to have such a stage, for example, a correct response for problem definition would be “clarifying the problem (1 mark) so that a statement of the problem may be articulated (1 mark)”.

For Part (d), most candidates did not give specific features of the spreadsheet or database management software that would be useful in solving the problem, for example, using SUM to calculate totals, AVERAGE to find the average, add/insert rows for new students, add/insert columns for new scores, etcetera. Instead, they identified features such as rows and columns, and perform calculations.

Section III - Information and Communication Skills

Question 11

This question assessed candidates’ knowledge and understanding of role and importance of information in problem solving. Most students generally performed satisfactorily on the question. A few of candidates scored full marks.

Most candidates scored full marks on Parts (a) and (b). However, there were a few candidates who could not provide an adequate response as to what is meant by “information is essential”. They ignored the stem of the question which, if read carefully, served as a guide to answering Part (a). As stated in the introductory paragraphs of the report, some candidates have had difficulty responding to questions requiring justification for their choices. Therefore, Part (c) was poorly done by a number of candidates.

Question 12

This question was designed to test candidates’ knowledge of the characteristics of information and, in particular, its format – structured, semi-structured and unstructured. It also examined the ability of candidates to compare information sources. Most candidates generally did this item poorly. A few of candidates scored full marks.

For Part (a), most candidates performed very poorly, indicating that they were unfamiliar with the concept of structured, unstructured and semi-structured information. Some responses hinted at “data through a channel in a suitable form to satisfy the needs of the user” or “data that is analysed, processed, accurate and meaningful”.

Appropriate responses should include the following:

Structured information is detailed; requires highly accurate, non-subjective data; records a narrow range of facts; is concerned about current and past events; and covers an organisation's internal activities. Supervisors and junior managers make operational decisions using structured information. Examples include records, transactions, and detailed reports.

Unstructured information is summarised; is concerned about past, current and future events; requires subjective data (such as hunches); records a broad range of facts; and covers activities within and outside the organisation. Unstructured information is the opposite of structured information. Top managers (executives) make strategic decisions using unstructured information. Examples include flexible, ad hoc reports, competitive industry statistics, and ideas.

Semi-structured information includes some unstructured information and some structured information. Middle managers make tactical decisions using semi-structured information. Examples include summarised reports, analytical and forecast reports.

For Part (b), a number of candidates did not provide any justification/explanation for what they perceived to be an advantage or a disadvantage. For example, candidates gave no reason to why "a book is considered to be more reliable than a person". To simply make a statement is not a sufficient response when the question requires that the candidates **discuss** an advantage/disadvantage.

Question 13

This question examined candidates' ability to critically evaluate information from a given source. This item was generally poorly done by most candidates. A few of candidates scored full marks.

Most candidates were unaware of the set of criteria that could be used to assess information from a given source.

In Part (b), most candidates did not correctly identify the information sources – newspaper and person (statistician) – and, therefore, their responses were inadequate. For Part (i), some criteria that could be used for the evaluation of the information source are the reputation of the writer of the article and the newspaper itself, the date of the publication and whether the writer had been in Iraq covering the war or just reporting second-hand information. Reputable journalist and newspapers that have published reliable, unbiased information over the years would continue to do so. Publishing on the Internet would not diminish the authenticity of the information. Similarly, for part (ii), if the author of the statistics is a known football statistician or the data was extracted from a FIFA publication or website, then the information should be reliable and unbiased.

Question 14

The question assessed candidates' ability to construct web pages. This question was generally poorly done by most candidates.

Most candidates generally did well on Part (a). However, many candidates gave incorrect responses for Part (b) and as a result failed to score any marks for Part (c). Incorrect responses include high-level and low-level languages, and human languages such as English and Spanish. Some of the languages that may be used to construct web pages are JavaScript, VBScript, HTML and XML.

Question 15

The question tested candidates' knowledge and understanding of hardware and software tools that could be used to communicate information to remote sites. This question was generally poorly done by most candidates. A few of candidates scored full marks.

Most candidates had difficulty in providing correct responses suggesting that either the schools did not cover the topic in-depth or the candidates did not grasp the essentials of communication between an office and remote sites. Other than computers, the telephone, facsimile, pagers and two-way radios are examples of hardware devices that could be used for communicating with remote sites. Any communicating software and interactive online services are examples of software, other than the email system, that may be used.

For Part (c), most candidates simply stated the advantage/disadvantage of the tool identified in (a) when compared with the computer. No explanation was given to demonstrate why it was considered to be an advantage/disadvantage.

PAPER II

Section I - Information Systems

Question 1

This question was designed to test candidates' knowledge and understanding of the software engineering process, including the participants involved and the tools that could be used in the process. The question was attempted by approximately twenty per cent of the candidates and was generally satisfactorily done by most candidates.

In Parts (a), several candidates had some difficulty to clearly state the role of the users in the software engineering process.

In Part (b), most candidates performed satisfactorily and they were able to identify four of the stages of the software engineering process.

In Part (c), most candidates were able to correctly identify and correct the errors found in the diagram. A few candidates knew where the errors were as evidenced by question marks or some other markings on the answer sheet, but somehow they could not explicitly state what the errors were and as such were unable to correct the errors.

In Part (d), most candidate provided responses that were, by a large extent, vague. Most of the responses focussed primarily on the company itself putting in the infrastructure of a wide area network (WAN), rather than using the infrastructure of telecommunications providers, for example, Cable and Wireless, or a government entity (such as TTST). Some other telecoms concerns are

- Availability of service in rural areas;
- Cost of implementing a WAN;
- The capacity of the network to handle demands and expectations of the company;
- The performance and reliability of the network;
- The security of the network;
- The type of services provided – Internet, IP telephony, VoIP, etc
- The number of players in the industry – one (monopoly) versus many (competition)

Question 2

This question examined candidates' knowledge and understanding of the legal, social and ethical issues that could arise from the use of information technology within organisations and the wider society. Most candidates performed poorly. Less than ten percent of the candidates obtained 20 or more marks.

For Part (a), although most candidates were aware that the storeowner was involved in software piracy, they did not name the law that was violated nor did they establish the link between the software and intellectual property and therefore, as such, the law governing intellectual property – the Copyrights Law – protected the work (the software) of the developer. A few candidates incorrectly referred to the law as the “Software Piracy Law”. Part (a)(ii) posed a challenge for most candidates, as they could not identify two benefits of the copyrights law to the software developer.

For Part (b), most candidates responded with a statement of the concerns rather than an examination of the implications of the issue of organisations relying solely on information technology. For example, most candidates stated that obsolescence was a concern, but failed to explain the financial and economic impact on companies if they wish to respond to changes and remain competitive in the market place.

For Part (c), most candidates described strategies that were inadequate to effectively minimise the concerns raised in Part (b).

Section II - Information Processing and Presentation

Question 3

This question assessed the candidates’ ability to distinguish between a spreadsheet package and a DBMS package in their application to solve real-life problems. The item was attempted by sixty per cent of the candidates. Most candidates performed very poorly. No candidate scored 20 or more marks.

Most candidates correctly identified the similarities between the two software packages. Some candidates gave responses that were unacceptable, for example, “both could be used in mail merge”. A more appropriate response would be “data from the DBMS and SS can be imported into a word processor and used in a mail merge exercise”. A few candidates stated that only Microsoft makes the DBMS and SS software packages. This is incorrect.

The responses of most candidates for Part (b) were extremely limited suggesting that these candidates did not have an-depth understanding and familiarity with the features of the two software packages and therefore were unaware of the advantages and disadvantages of the spreadsheet package when compared with a DBMS package. The candidates who provided good responses examined the following advantages and disadvantages:

Advantages:

- Automatic recalculation of data;
- The use of absolute cell referencing;
- Ability to view data and results of computations in the same worksheet rather than having to another option (report module in DBMS);
- Ability to easily generate a plethora of charts and graphs;
- Ability to not only copy and paste rows but also, cells and columns.

Disadvantages:

- Possess no normalisation (relationships) feature to minimise data redundancy;
- Limited data integrity features;
- Extremely difficult to develop software programs using a spreadsheet.

Most candidates produced a table structure, with data, for the design of input screen in Part (c). Therefore, these candidates could not obtain the full marks as table structures do not lent themselves to good input screen techniques such as appropriate headings, instructions, spacing, the use of icons, combo boxes, radio button, and other navigational aids.

Most candidates seemed to be aware of the concept of validation checks, as they were able to identify the data elements (for example, student identifier, subject score, type – exam or class assignment, and subject) for which validation checks could be applied. Unfortunately, many could not describe the appropriate validation check that should be associated with a particular data element. For example, an appropriate validation check for subject score should be “the number must be greater than or equal to 0, but less than or equal to 100”.

Question 4

The question examined candidates’ knowledge and understanding of the relevant considerations that should be examined in order to select the most appropriate software tool (package) for a given task. The item also tested the ability of candidates to select and justify their selection of the most appropriate tool for a given task. Most candidates performed poorly.

For Parts (a) and (b), most candidates misinterpreted the question and therefore gave responses for the stages of either problem solving or software engineering, rather than issues to be assessed when selecting a tool for a given task. Considerations to be examined are as follow:

- Type of analysis to be done (calculation, statistical, forecasting, trend, etc)
- Type of processing (online, batch, real-time)
- Type of data (text, numeric, audio, graphic, etc)
- Type of storage medium (tape, diskette, paper, etc)
- Type of retrieval (sequential, random, indexed sequential)
- Type of reports (detailed, summarised, ad hoc, etc)

For Part (c), most candidates were able to adequately describe two types of user interface, but many failed to show how the interface guides and directs someone in the use of the tool. An appropriate response for a graphical user interface would be as follows:

Consist of menus, icons and controls, which provide not only instructions or options available to users, but serve to initiate actions to be taken by the computer once a selection is made, for example, printing of a document once the user click on the printer icon.

For Part (d)(i), most candidates performed satisfactorily. For Part (d)(ii), most candidates opted for a media player rather the presentation software with multimedia capabilities.

Section III - Information and Communication Skills

Question 5

This question was designed to test the candidates’ knowledge and understanding of information sources, and the steps involved to create, publish and maintain web pages. The item was attempted by approximately fifty per cent of the candidates. Most candidates performed poorly.

Part (a) was generally well done by most candidates, as they identify several information sources. Candidates should be encouraged to provide generic terms rather than a named publication, for example, newspapers rather than “The Observer”.

Part (b) was very poorly done well as most candidates gave responses which focussed primarily on the steps involved in getting the document into an electronic form, that is, moving from a hardcopy to a softcopy, rather than on the steps of designing, publishing and maintaining the web page(s) that would derived from the document.

Part (c) posed a challenge for most candidates. Some candidates describe the underlying problem associated with the errors, but failed to propose a strategy to solve the problem. As stated in the Introduction of this report, it would seem that some schools were not allowing students to gain hands-on experience in constructing web pages as it was no longer required for the Internal Examination. Schools are encouraged to have their students to build web pages/site.

Question 6

This question was attempted by fifty per cent of the candidates. It assessed candidates' knowledge and understanding of the consequences when a company fails to consider the characteristics of information, and their ability to critically evaluate information coming from certain information sources. This question was generally poorly done.

For Part (a), most candidates understood what was meant by the term "characteristics of information" and were able to make statement regarding the consequences when a firm fails to consider the characteristics of information – poor decisions, inability to successfully solve problems, loss of jobs; loss of reputation/credibility; loss of customers' trust; etcetera. However, only a few candidates used examples to demonstrate how ignoring the timeliness, accuracy, completeness, etcetera of information affected a firm.

For Part (b), most candidates did not critique the information sources but rather the statements (information) from the sources. For example, for Part (i), some candidates spoke of the relevance of the statement, but ignored the fact that any organisation or person can place information on the Net, and as an information source, it is un-refereed. However, there are reputable organisations and persons who will publish information on the Net. In such instances, the statements would be considered to be accurate and reliable.

INTERNAL ASSESSMENT

This project enabled candidates to examine the potential uses and issues related to a particular emerging technology, and to determine its applicability to their environment (school, community, country or the Caribbean region). Additionally, it enabled the candidates to demonstrate skills and competencies from each of three modules.

The candidates who scored high used the sub-headings in the marking schemes of the modules to structure and organise their report and web pages, thereby, focussing on the areas that were relevant to the study.

Some candidates submitted very good papers, indicating that they:

- (a) carefully selected a topic relevant to the specific objectives of the syllabus;
- (b) conducted a thorough review of the emerging technology;
- (c) collected and analysed data that had relevance to their study.

In addition, these candidates demonstrated mastery of the tools used to process and present their findings, and were able to make recommendations that were supported by data.

Some of the more appropriate topics submitted for moderation include:

- 64-bit processing (Hardware: processor)
- Dual-layered disks (Hardware: storage)
- Biometric passports (Hardware: input device – barcode)
- H.264 (Software: video compression standard)

Very popular topics that were inappropriate due to when the technology emerged include:

- Mobile telephones (emerged in the 1970s)
- Global Positioning Systems (emerged in the 1970s)
- Digital cameras (emerged in the 1980s)
- MP3 playback devices (emerged in the 1990s)

However, it should be noted that, where the latest model or enhancement of any of the technologies listed above has emerged within the past 36 months, then the technology would be appropriate, for example, the Motorola Razor for mobile telephones.

The following topics are outside the scope of the syllabus and as such should not be done:

- Airbus A380 (long range commercial/passenger jets)
- Mitsubishi Evolution and Bentley (high-end motor cars)
- Genetic Cloning

Section I - Review of Emerging Technology

Most candidates failed to describe all the details of the emerging technology. Consequently, it was difficult to establish whether the selected technology could really be categorized as emerging in the candidates' environment. A good response describing the technology should ideally include:

- details of who developed the technology
- when the technology was released (or the proposed release date)
- details of the information systems sub-category in which the technology may be placed
- key features of the technology

A statement including an identification of the user's environment (school, community, country, Caribbean region) should also be included.

Some candidates did not identify a comparable existing technology and as such were not able to provide a complete description of similarities and differences. For example, a digital camera was erroneously identified as comparable existing technology to a web camera. A video camera would have been a much more correct response.

As it relates to **potential uses** of emerging technology, it is not adequate just to state the intended function of the device (if a device is being discussed) but rather:

- a) suggest innovative ways how the technology could be used in the user's environment to solve day-to-day problems;
- b) fully describe the suggested potential uses.

Concerning potential drawbacks, candidates may choose to fully explain drawbacks based either on their literature review or on the proposed uses (in their own environment) of the technology.

Section II - Applicability of Technology

This section was generally poorly done. Many candidates failed to recognize the link between Sections 1 and 3 of the project and as such did not collect data that would help to arrive at a conclusion as to the technology's applicability. In quite a few cases, absolutely no data was collected, however, candidates went on to make recommendations that clearly had no data support.

An increasing number of candidates confused data types with data fields. Data types refer to text, numeric, date/time, currency, Boolean, etc whereas data fields refer to the names given to data elements within a table, for example, in a table called student, some data fields could be name, date of birth, gender, address and telephone. The syllabus guideline clearly indicates that marks will be awarded for **identification and justification of ALL relevant data and sources**. Candidates were therefore required to identify:

- the data item that would be collected, for example. the number of persons in the environment that faced a particular problem that would be suitable for solving by the use of the emerging technology
- the data type of the data being collected, numeric in the above example
- the source from which the data could be collected - potential users in the user's environment in this case.

All relevant data and sources identified must be justified for maximum marks to be awarded.

Some candidates collected and analysed data that has little or no relevance to their study. Also, graphs and tables were included in their reports without any justification for their inclusion.

For Data Processing Methods, many candidates erroneously described how the word processor was used to enter, edit and format text that was obtained from web sites on the Internet. This task refers to how the **data** that was collected from the user's environment was processed. For numeric data, this could include tabulation of the data in a spreadsheet, development of a range of formula to compute meaningful indices or simply finding the average of a set of values or plotting a graph. Teachers are encouraged to use the *Recommended Teaching Activities in the Syllabus* to foster an appreciation of the features provided by software tools that may be used to solve a range of everyday problems.

Section III - Summary of Research

This section was also poorly done. In the absence of data collection and analysis in Section II, very little meaningful work could be accomplished in this section. Very few candidates raised any validity issues worthwhile of mention. Of the few that did so, none of them undertook a comprehensive discussion indicating whether the findings were worthwhile or not.

Many candidates failed to identify possible follow-up projects but rather make suggestions (to the developer) as to how the technology could be improved. The intent here is for candidates to identify a project that could be done in continuation of the current research to assess the applicability of the technology in the environment. As an example, a candidate who discussed *Biometric* Passports and concluded that they were applicable to their country suggested that a follow-up project could be "*to assess the potential health risks associated with the use of Biometric Passports*".

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2007**

INFORMATION TECHNOLOGY

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INFORMATION TECHNOLOGY**CARIBBEAN ADVANCED PROFICIENCY EXAMINATION****MAY/JUNE 2007****GENERAL COMMENTS**

The number of candidates sitting this year's examination increased when compared with the number entered for the examination in 2006. The overall performance for this year was slightly higher than in 2006, with 82.77 percent of the candidates achieving Grades I – IV when compared to 79.96 percent, in 2006. A few candidates (seventeen) sat Paper 03/2.

The quality of candidates' responses is a major concern to the examiners. Questions that assess the high order skills (Application and Analysis, and, Synthesis and Evaluation) continue to pose a challenge to the majority of candidates. This was evident by the low scores on questions that use verbs such as explain, justify, discuss, examine and distinguish. In addition, a number of candidates failed to appreciate the significance of marks ascribed to questions. Questions worth two or more marks, require more than a simply statement of fact. For example, where the question requires the candidates to **discuss, explain or justify a choice**, then a statement is not a sufficient response. In addition, the candidates need to be aware of the meaning and distinction between verbs.

Except for questions 12 and 13 on Paper 01 and Questions 2, 5 and 6 on Paper 02, the examiners wish to report that few candidates scored full marks. An analysis of candidates' performance by module revealed that candidates did better on questions in Module 1, Paper 01, than those in the other modules. The performance on questions in Module 2 was similar to that on questions in Module 3. Regarding Paper 02, the performance on questions in Module 1 and Module 2 was about the same, but was significantly higher than that on questions in Module 3. Questions on Paper 03/2 were generally poorly done.

To address the concerns regarding the poor quality of responses to questions, that use such verbs as explain, justify, evaluate, examine and distinguish, teachers are encourage to include more questions using such terms on the internal examination papers and homework assignments.

As stated in the previous year's report, since the removal of web page development from the Internal Assessment project, candidates have performed poorly on questions about web pages. The examiners wish to encourage teachers to have their students' design, develop and implement personal or school websites.

Internal Assessment

The quality of the internal assessments submitted for moderation this year was better than in previous years. The examiners are pleased to report that some candidates scored full marks and an increased number of candidates scored 52 (out of 60) and above. There was evidence to suggest that some centres utilised the comments contained in previous schools' reports and this impacted favourably on the choice of topics and the treatment given.

There was also a marked improvement in the quality of the assessment by teachers in some centres. In these cases, the mark scheme was consistently applied and all the required reports were correctly completed and submitted. In a few cases, the marks awarded could not be substantiated by the work presented in the samples.

A significant number of candidates selected technologies that were ideal. These have emerged within the past 36 months and relate to information systems (hardware, software and telecommunications, whether infrastructure, tools and services). Too many centres however, still continue to research technologies that have been around for several decades, and as such cannot be considered, 'emerging'. Additionally, a few candidates chose technologies that are outside the scope of the syllabus.

PAPER 01**Section I - Information Systems****Question 1**

The question examined candidates' knowledge and understanding of the types of computers and the type of processing (task) that they were designed to accomplish. This was satisfactorily done by most candidates. Over twenty-five percent of candidates who attempted the question scored 7 or more marks. Less than four percent of candidates scored full marks. Approximately seven percent of the candidates failed to score any marks.

Several candidates cited the types relating to microcomputers (personal computers) such as desktops, laptops, notebooks and handheld computers rather than super computers, mainframe computers, minicomputers and microcomputers. A number of candidates mentioned terms such as microprocessor and macro-processor as types of computers.

For those candidates who correctly identified the types of computers, the majority of them were unable to state a task for which the supercomputer and mainframe computer were most appropriate. They incorrectly responded that these computers were used in the home for domestic proposes. Supercomputers are used in applications that require large amounts of processing or in environments where long complex calculations are preformed. They are ideally suited for worldwide weather forecasting and analysis of weather phenomena, whereas mainframe computers are designed to be used in applications that process large amounts of data and support hundreds of users at any given time. They are ideally suited for airline reservations and ticketing as well as the processing of customer accounts at a national bank.

Question 2

The question assessed candidates' knowledge and understanding of the network topologies other than the bus topology. Most candidates generally did this question satisfactorily. Approximately thirty percent of candidates scored 7 or more marks. Approximately one percent of candidates scored full marks. No candidate who attempted the question failed to score a mark.

For part (a), most candidates accurately defined the term "computer network" by identifying it as a system of interconnected computers, cables and other communication devices that allow users to share programs, files and devices.

For part (b), most candidates correctly identify and describe a topology (star, ring or hybrid) other than the bus topology. A number of the candidates however, were unable to state the topology's advantage or disadvantage when compared with another. For the ring topology, some candidates made mention of a host computer or server.

For part (c), a number of the candidates incorrectly provided a labelled diagram of the star topology as a ring topology, or vice versa. Others provided a sketch, that is, nodes were not labelled and there was no indication of the direction of messages between the nodes.

Question 3

The question was designed to test candidates' knowledge and understanding of input devices. The question was generally well done by most candidates. Approximately 70 percent of the candidates scored 7 or more marks. Sixteen percent of candidates scored full marks. However, two percent of the candidates failed to score any marks.

Most candidates were able to correctly list three input devices as well as state the type of data that these devices capture.

In part (c), a number of candidates merely listed the task performed by the input device and therefore there was no difference in their response when compared with part (b); for example, one candidate simply wrote, 'enter text' for the task, with respect of the keyboard, rather than 'to enter text (words, numbers and special characters) to create a word document or work sheet'. Similarly, a more appropriate response for a task performed with the mouse would be 'to make a selection from a set of options from a pop-up menu' rather than 'to select an option'.

Question 4

This question examined candidates' knowledge and understanding of system software and their ability to assess the implications for a business entity when system software is changed frequently. Generally, most candidates did this question satisfactorily. Approximately 25 percent of the candidates earned 7 or more marks, with three percent scoring full marks. Eight percent of candidates failed to score any marks.

Most candidates were aware that system software was a collection of programs, which allow the computer to manage and control its resources. In addition, some of these candidates did not confuse the term "system software" with the operating system but rather demonstrated their understanding by accurately listing operating systems, utilities, device drivers and language translators as sub-categories (types) of system software.

For part (b), a number of candidates named operating systems such as Microsoft XP, Microsoft 98, Novell, Linux and Unix as types of system software suggesting that system software and the operating system were same thing.

For part (c), several candidates identified and examined implications such as cost, training, improved performance/productivity and acquisition of skills that could arise when an entity changed system software on a regular basis. Both the negative and positive aspects of the implication were discussed. A few candidates misinterpreted the question and as such made suggestions as to what the company could do to avoid changing system software, frequently.

Question 5

This question assessed candidates' knowledge and understanding of communications technology and in particular, wireless communications technology. It also tested their ability to examine the benefits of this technology to a business entity. Most candidates performed satisfactorily. Approximately thirteen percent of the candidates scored 7 or more marks. Approximately one percent of the candidates scored full marks with less than half of one percent of them failing to score any marks.

Section II - Information Processing and Presentation

Question 6

This question assessed candidates' knowledge and understanding of the purpose of various software packages. A few of candidates scored full marks but most candidates performed poorly.

For Part (a), most candidates gave vague responses or their responses were simply a 'play on words' of the term, for example, 'financial software is used to perform financial tasks'. Also, a number of the candidates seemed to have confused the presentation software with the Desktop Publishing (DTP) software. Therefore, the tasks peculiar to DTP packages were ascribed to presentation packages.

For Part (b), most candidates were unaware of the advantages/disadvantages of DTP software when compared with a word processing tool.

Question 7

The question assessed candidates' ability to examine a situation and identify appropriate software tools that could be used to provide a solution. This question was satisfactorily done by most candidates, although only one candidate scored full marks.

Most candidates correctly identified the productivity tools that are designed to **store and process large volumes of data** - the database management system and spreadsheet packages. Word processing and DTP software were unacceptable responses based on the scenario which was given in the question. In addition, appropriate arguments concerning the features of the packages were provided as justification for their choices.

In Part (c), a number of candidates misinterpreted the question and therefore described productivity tools that could be used to present the data to management rather than the formats that should be used to present these data. Appropriate formats included tables, graphs, charts, and free format (as in text) **OR** hardcopy (printed report) and softcopy (electronic format using a presentation tool).

Question 8

The question tested candidates' knowledge and understanding of user interfaces. Most candidates did this question at an acceptable level. A few of candidates scored full marks.

In Part (a), most candidates seemed unaware that the user interface **controls** the interaction between the user and the operating system (O/S) or application program; that is, the interface determines how the user should communicate with the O/S or application program, and vice versa. The candidates' responses implied that the communication flow was from the user to the computer only as there was no mention of the response/feedback from the computer to the user's action or command.

Part (b) was generally well done by most candidates. Several candidates however, did not correctly name the interfaces, for example, 'command-driven', 'menu user interface'.

Part (c) was generally poorly done by most candidates. This seemed to suggest that the candidates were not familiar with the features and advantages/disadvantages of the various user interfaces.

Question 9

This question assessed candidates' knowledge and understanding of the two formats that a person could use to send and receive files electronically, such as e-mail messages. A few candidates scored full marks but most candidates did poorly on this question.

For Part (a), most candidates could not distinguish between 'rich text' and 'text file' formats.

Part (b) required candidates to discuss two advantages of sending a file in rich text format when compared to text file format. Very few candidates knew that rich text supported a wider range of formatting features, such as bold, italicize, underline, indent, font style and size, along with others. A 'rich text' message could highlight selected aspect of a message and be aesthetically pleasing. Formatting features are not facilitated in text files.

In part (c) most students seemed not to be aware that rich text files are larger than text files (containing the same amount and type of data), and hence would take longer to upload/download. Also, rich text files cannot be read by all software applications.

Question 10

The question examined candidates' knowledge and understanding of database concepts. A few of candidates scored full marks but most candidates performed poorly.

Generally, most candidates showed a lack of appreciation for the technical terms and offered a rather literal explanation for technical words/phrases. This of course led to the lack of specificity when attempting to explain the terms in relation to DBMS.

- Normalization – a fair attempt by most candidates but not completely accurate.
- Validation check – was confused with term 'Verification'. Most candidates were not aware that a validation check is applied to source data in an attempt to ensure that data are correctly entered, thereby minimising the possibility of human error.
- Record – was explained literally with reference to recording of data rather than 'a set of related attributes (fields) used to store data about a member of a particular entity'.
- Form – was confused with paper forms for capturing data rather than viewed as a type of object that is primarily used to enter or display data in the database.
- Default Value – was explained in terms of default settings for software packages such as Word and Excel, and not with reference to the value that is assigned to a data item during data entry.

Section III - Information and Communication Skills

Question 11

This question assessed candidates' knowledge and understanding of information sources. Most students generally performed satisfactorily on the question. A few candidates scored full marks.

In part (c) many students seemed not to understand what was required. They were asked to give one advantage AND one disadvantage of EACH of the two information sources identified in part (b) of the question. Many students gave just one advantage and one disadvantage of ONLY ONE information source. In some instances, the advantage and disadvantage given were not for the same information source identified.

Question 12

This question was designed to test candidates' knowledge and understanding of interactive online services. Most candidates generally did this item poorly.

Part (a) asked the candidates what is meant by 'interactive online services.' Many students failed to appreciate that this referred to a 'dialogue' between the computer system and the user done in 'real-time.'

In Part (b), many described activities and services that were not interactive, such as the completion of online application forms, online shopping and online banking. Examples of **interactive** online services include the following:

- Text based chat
- Internet Relay Chat (IRC)
- Instant Messaging
- Online Gaming
- Multimedia chat
- Video-conferencing with two-way communication.

In Part (c), as most candidates focussed on 'online services' rather than '**interactive** online services', the benefits discussed were not applicable.

Question 13

This question examined candidates' knowledge and understanding of Internet/web concepts. This item was done at an acceptable level by most candidates.

A number of candidates gave responses concerning what each item is rather than providing an explanation of the main function of the item. In addition, the response given by most candidates regarding Virtual Private Networks (VPN) indicated that they were unfamiliar with this concept.

Question 14

The question assessed candidates' ability to construct web pages. This question was generally poorly done by most candidates. A few candidates scored full marks.

Most candidates generally did well on part (a). However, many candidates were unable to describe the actual steps to be done in order to publish a report such as a research paper, which was already in electronic format, on the Web. A few candidates misinterpreted the question and discussed considerations such as colours, navigation and copyrights that someone should bear in mind when constructing a webpage.

An example of some possible steps:

- Convert to HTML document
- Organise into web pages
- Edit or change the size, alignment, font and colour of the text to improve 'look' of pages
- Add images, if appropriate
- Upload to web or host server
- Add links to other websites, if appropriate.

Question 15

The question tested candidates' ability to distinguish between the Intranet and Internet. This question was generally done at an acceptable level by most candidates. A few of candidates scored full marks.

For part (a), most candidates were aware that the Intranet restricts access to users within an organisation or firm unlike the Internet, which grants access to anyone with a computer, modem and ISP account.

For part (b), most candidates could identify a situation however, only a few of the candidates could adequately describe the situation. It was apparent that they did not recognise the similarities between the Intranet and Internet. These candidates viewed the Intranet in terms of a local area network rather than a network that uses the same infrastructure, protocols and standards as the Internet. They therefore failed to recognize that tasks performed on the Internet could also be done on the Intranet. As such, a firm may opt to publish the findings of a survey regarding employees' perception of management-workers relationship on the Intranet rather than on the Internet. In this way, the findings would remain confidential, as access is restricted to only employees of the entity.

For part (c), most candidates simply stated the limitation but failed to justify why this could be viewed as a limitation. A few candidates seemed unsure of the meaning of the word 'limitation'.

PAPER 02**Section I - Information Systems****Question 1**

This question was designed to test candidates' knowledge and understanding of automation in relation to Information Technology and the implications for business entities and the society when organisations embark on automation. The candidates were also asked to propose strategies that would minimize or eliminate the negative impact of automation. The question was attempted by approximately eighty-five percent of the candidates and was generally done at an acceptable level by most candidates.

In parts (a), most candidates defined automation in its widest sense; the use of machines, rather than in relation to Information Technology; the use of computers and related equipment to transform data into information, to store and maintain data.

In part (b), most candidates performed satisfactorily. They were able to identify positive and negative implications that could result from an entity automating its processes. A number of candidates gave reasons to support their statements but this was not required for this part of the question. These candidates need to be aware of the distinction between **state** and **discuss**.

In part (c), a number of candidates could not show why the implication was negative or positive. Their arguments lacked depth or were vague and as such the discussion was incomplete; For example, in discussing greater efficiency as a positive implication, the candidate was expected to mention an increase in output from the same quantity of input arising from fewer human errors, a reduction in time to achieve result and/or reduction in waste or number of times of re-work.

In part (d), most candidates were unable to identify and discuss effective strategies to mitigate against the negative implication.

Question 2

This question examined candidates' knowledge and understanding of the hardware subsystems – input, processor, memory, (auxiliary or secondary storage), and output – of the computer system, and the relationship between subsystems. Approximately fifteen percent of the candidates attempted this question. Most candidates performed at an acceptable level.

Part (a) was generally well done by most candidates. A few candidates incorrectly named devices, for example, keyboard/mouse, printer/plotter rather than giving the name of the subsystem. As such, these candidates failed to score the marks allocated.

Part (b) was poorly done by most candidates as they responded with only a sketch and not a **labelled** diagram. To show the relationship between a pair of subsystems, candidates should use an arrow, with the arrowhead indicating the direction of flow of data/information between the two subsystems.

Part (c) was satisfactorily done by most candidates. Some candidates lost marks because their discussion was not well organised and complete.

Part (d) was poorly done by most candidates. Candidates were expected to show how a named example (plotter, mouse, etc.) was appropriate to the firm's requirements – an architectural firm that designs house plans for its clients. Without naming a particular device of the subsystem, the candidates were unable to adequately address the appropriateness to the firm.

Section II - Information Processing and Presentation

Question 3

This question assessed the candidates' knowledge and understanding of the purpose and features of three named software packages, as well as problems that could arise when persons use the packages. The item was attempted by approximately seventy percent of the candidates and was generally done at an acceptable level by most candidates.

In Part (a) most candidates were able to describe scenarios where persons could use spreadsheets and database management systems. However, for financial packages, many of them described scenarios which were more suited to spreadsheets.

Parts (b) and (c) were generally well done by most students.

Question 4

The question examined candidates' application of the steps in problem solving that a musician would take in moving from handwriting his music to writing the music electronically using a software program. Approximately thirty percent of the candidates did this question. Most candidates performed at an acceptable level.

In part (a) most candidates listed the stages of the systems development life cycle. What was required were the steps involved in problem-solving – problem definition, analysis, evaluation of possible solutions, selection, implementation and review.

Part (b) was fairly well done. Several candidates however, could not distinguish between custom-written packages and “off-the-shelf” packages.

Part (c) was well done by most students.

Section III - Information and Communication Skills

Question 5

This question was designed to test the candidates' ability to construct web pages as well as their knowledge and understanding of the use of hyperlinks in web page development. The question was attempted by approximately twenty percent of the candidates. Most candidates performed poorly.

In part (a) most candidates did not explain that hyperlinks can be a word or phrase or graphic (image) that directs users to another web page for additional information.

In part (b) (i) most candidates could not adequately explain any three of the keywords, tags or lines in the given section of HTML code. It would appear that this was not addressed by many teachers/students.

Part (c) asked candidates to discuss two benefits of using hyperlinks in documents. This was fairly well done. Very few students referred to the help hyperlinks provided to users in focussing on a topic amidst the large volume of data on the Internet, or that hyperlinks help to reduce the time taken to locate required information.

Part (d) required candidates to discuss problems associated with using hyperlinks in web pages. This section was poorly done. Some students were able to briefly discuss some problems but most were not able to provide feasible solutions.

Candidates generally demonstrated a lack of knowledge of the technical terms in the question. Explanations and discussions lacked coherence.

Question 6

This question was attempted by eighty percent of the candidates. It assessed candidates' ability to critically assess extracts of information by examining the source of the information. This question was generally poorly done.

In parts (a) and (b), most candidates understood what was meant by the term 'characteristics of information' and listed six characters of information, respectively.

In Part (c), most candidates did not critique the information sources but rather the statements (information) from the sources. For example, in part (i), many candidates examined the accuracy of the statement and ignored the fact that the information source was not cited. Therefore, making certain assumptions, it could be argued that the information may or may not be accepted.

PAPER 03/1 - INTERNAL ASSESSMENT

This project allowed candidates to examine the potential uses and issues related to a particular emerging technology and determine its applicability to their environment (school, community, country or the Caribbean region). Additionally, it enabled the candidates to demonstrate skills and competencies from each of the three modules.

The candidates who scored highly used the sub-headings in the marking schemes of the modules to structure and organise their report and web pages. This allowed them to focus on the areas that were relevant to the study.

Some candidates submitted very good papers, indicating that they:

- (a) carefully selected a topic relevant to the specific objectives of the syllabus;
- (b) conducted a thorough review of the emerging technology;
- (c) collected and analysed data that had relevance to their study.

In addition, these candidates demonstrated mastery of the tools used to collect, store, analyse and present their findings, and were able to make recommendations that were supported by data.

Some of the more appropriate topics submitted for moderation included:

- Wi-Fibre G 2.7 (Communications infrastructure)
- 3G Mobile (Communications infrastructure)
- Near Field Communications (Communications infrastructure)
- Online Office suites (Application software)
- RFID Technology (Hardware: Input sensing technology)
- 3-D Printing (Hardware: Hard copy output technology)
- Holographic storage (Hardware: mass storage)
- Multi-core processors - Dual & Quad Core: (Hardware: Processors)
- Nanotechnology (Hardware)
- Apple iPhone (Communication device: smartphone)

Very popular topics that were inappropriate due to when the technology emerged include:

- Mobile telephones (emerged in the 1970s)
- Global Positioning Systems (emerged in the 1970s)
- Digital cameras (emerged in the 1980s)
- MP3 playback devices (emerged in the 1990s)
- Compact flash (emerged in the 1990s)

However, it should be noted that, where the latest model or enhancement of any of the technologies listed above has emerged within the past 36 months, then the technology would be appropriate, for example, the Apple iPod Nano for MP3 playback devices.

The following topics are outside the scope of the syllabus and as such, these and similar topics should not be considered:

- Touchless Trashcan: although uses a chip, the information processing capabilities are extremely limited; the opening of lid when the hand or trash is within 6 inches of the lid, and the closing of the lid 3 seconds after the hand is removed.
- Floating Bed
- Mitsubishi Evolution X

Section I - Review of Emerging Technology

Many candidates failed to describe all the details of the emerging technology. Consequently, it was difficult to establish whether the selected technology could really be categorized as emerging in the candidates' environment. A good response describing the technology should ideally include:

- details of who developed the technology
- when the technology was released (or the proposed release date)
- details of the information systems sub-category in which the technology may be placed
- key features of the technology.

A statement including an identification of the user's environment (school, community, country, Caribbean region) should also be included.

Some candidates did not identify a comparable existing technology and as such were not able to provide a complete description of similarities and differences. For example, a digital camera was erroneously identified as comparable existing technology to a web camera. A video camera would have been a more appropriate response. For those who identified comparable technologies (VOIP vs. POTS/PSTN, Bluetooth vs. infrared, compact flash vs. external IDE drives), similarities and differences were adequately identified and described.

Regarding **potential uses** of emerging technologies, it is not adequate to simply state the intended function of the device (if a device is being discussed) but rather:

- (a) to suggest innovative ways as to how the technology could be used in the user's environment to solve day-to-day problems;
- (b) to fully discuss the suggested potential uses.

Concerning potential drawbacks, candidates may choose to fully explain drawbacks based either on their literature review or on the proposed uses (in their own environment) of the technology.

Section II - Applicability of Technology

This section was generally poorly done. Many candidates failed to recognize the link between Sections 1 and 3 of the project and as such did not collect data that would help to arrive at a conclusion as to the technology's applicability. In quite a few cases, absolutely no data were collected, however candidates went on to make recommendations that could not be supported.

As in previous years, candidates continue to confuse data types with data fields. Data types refer to text, numeric, date/time, currency, boolean, and so on. Data fields refer to the names given to data elements within a table, for example, in a table called student, some data fields could be named, date of birth, gender, address and telephone. The syllabus guideline clearly indicates that marks will be awarded for **identification and justification of ALL relevant data and sources**. Candidates were therefore required to identify:

- the data item that would be collected; for example the number of persons in the environment that faced a particular problem that would be suitable for solving by the use of the emerging technology
- the data type of the data being collected; for example, **numeric** in the above bulleted example
- the source from which the data could be collected.

All relevant data and sources identified must be justified for maximum marks to be awarded.

Some candidates collected and analysed data that had little or no relevance to their study. Also, graphs and tables were included in their reports without any justification for their inclusion.

For Data Processing Methods (Task 2.3), this was inadequately addressed by many candidates who only described how the word processor was used to edit and format textual data that was obtained from web sites on the Internet. This task refers to how **all data** collected from the user's environment were processed. For example, regarding numeric data, this could include tabulation of the data in a spreadsheet, development of a range of formula to compute meaningful indices or simply finding the average of a set of values or plotting a graph. Teachers are encouraged to use the *Recommended Teaching Activities in the Syllabus* to foster an appreciation of the features provided by software tools that may be used to solve a range of everyday problems.

Section III - Summary of Research

This section was also poorly done. In the absence of data collection and analysis in Section II, very little meaningful work could be accomplished in this section. The examiners noted an increased number of candidates who raised validity issues worthwhile of mention. Of those that did so, a few of them undertook a comprehensive discussion indicating whether the findings were worthwhile or not.

Many candidates failed to identify possible follow-up projects but rather make suggestions (to the developer) as to how the technology could be improved. The intent here is for candidates to identify a project that could be done in continuation of the current research to assess the applicability of the technology in the environment. As an example, a candidate who discussed *Voice Over Internet Protocol (VOIP)* and concluded that it was applicable to their country suggested that a follow-up project could be '*to assess the service and satisfaction levels associated with the use of VOIP*'.

Candidates should be reminded that the Layout of References must be done using the APA or MLA style and that ALL references used (including personal contacts) should be listed.

PAPER 3/2 – ALTERNATE PAPER

Section I - Review of Emerging Technology

The question tested candidates' knowledge and understanding of the emerging technology that they studied. Most candidates performed poorly.

In Part (a), most candidates merely identified the emerging technology rather than providing a description of the technology.

In Part (b), most candidates listed a number of uses of the technology. The main purpose of the technology was not discussed. An appropriate response, for example, with regard to the Bluetooth technology would be as follow:

To provide connection and exchange of data within a restricted range of less than 100 metre and using a relatively low bandwidth.

In Part (c), most candidates responded with a statement or partial discussion of each benefit.

Section II - Applicability of Technology

The question assessed candidates' ability to use IT tools to determine the applicability of the emerging technology in their environment. Most candidates performed poorly.

The candidates' responses suggested an unawareness of the following:

- Data types in relation to Information Technology. Responses such as 'primary data' and 'factual data' were given;
- Data collection methods – the use of questionnaires; interviews; observation; investigation/research;
- Data storage methods – the use of programs such as DBMS, spreadsheets, and statistical tools.
- Data analysis methods – the use of graph, charts, tables, and other features to display trends and patterns.

Therefore, the basis of their discussion and explanation was inaccurate.

Section III - Information and Communication Skills

The question tested candidates' knowledge and understanding of IT tools which could be used to communicate the findings of the research with the Public. Most candidates did poorly.

Most candidates described features of the tools identified in Part (a), rather than to show **how** they would use the features of the tools to present the information relating to the findings to the Public. Discussion of the problems when using a tool was, to a large extent, not organised, or merely simply a statement of problems.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2008**

**INFORMATION TECHNOLOGY
(REGION EXCLUDING TRINIDAD AND TOBAGO)**

INFORMATION TECHNOLOGY
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
GENERAL COMMENTS

The number of candidates sitting this year's examination decreased when compared with the number entered for the examination in 2007. The overall performance for this year was slightly higher than 2007.

Despite suggestions and recommendations from the Examining Committee in previous years' reports, the quality of candidates' responses on Paper 02 continues to be of major concern to the examiners. Questions, which assessed the high order skills, such as, Application and Analysis (AA) and Synthesis and Evaluation (SE), have posed a challenge for the majority of the candidates as evidenced by the low scores on questions that use such verbs as explain, justify, discuss, examine and distinguish. In addition, a number of candidates have failed to provide appropriate responses based on a given scenario. Their responses oftentimes completely ignore the scenarios and therefore are unacceptable.

To address the concerns regarding the poor quality of responses to questions, which use such verbs as **explain, justify, evaluate, examine and distinguish**, teachers are encourage to include more of such questions on internal examination papers and for homework assignments.

A few candidates scored full marks on Questions 1, 3 and 6 of Paper 02. An analysis of candidates' performance by module revealed that candidates did better on the questions in Module 1, followed by Module 2, then Module 3.

Improved performance was seen in the quality of responses for questions on Paper 03/2 when compared with performance on previous examinations.

INTERNAL ASSESSMENT

The Council received a vast number of Internal Assessment (IA) reports. A wide range of emerging technologies were examined, including:

- Blue Ray Disc
- HD DVD
- Graphene FET
- Micoach Personal Trainer
- Smart Phones
- Bionic Contact Lens
- Video Glasses
- VoIP
- Fly by Wire
- DSL
- WiMAX
- Wi Fi
- GPS Shoes

Most of the topics were well chosen and researched. However, in some instances, topics were examined that cannot be considered emerging in the territory of the candidates as they have been in existence for more than two years. Some of these topics are:

- ADSL
- GSM
- Bluetooth
- Wireless technology

In addition, some topics examined clearly cannot be considered an emerging technology in the field of Information Technology.

There were instances where topics chosen by candidates were so new to the market that very little researchable information existed, hence candidates found it very difficult to fully describe the technology, give a relevant comparable existing technology and/or give potential uses of the technology.

Overall, effort was made to ensure most projects were organized and well presented. There was obvious evidence of research, and guidance from teachers.

PAPER 01

A new format for Paper 01 was introduced: a shift from a series of short answer responses to multiple-choice format.

The paper was comprised of 54 items, with 18 items per module.

PAPER 02

SECTION I

INFORMATION SYSTEMS

Question 1

This question examined candidates' knowledge and understanding of the hardware subsystems – input, processor, memory, (auxiliary or secondary storage), communication, and output – of the computer system, and the relationship between subsystems, as well as, the health problems that could arise from the use of the computer system. The question was attempted by approximately sixty-five percent of the candidates and was generally done by most candidates. Approximately 65 per cent of the candidates scored 20 or more marks.

In Parts (a) and (b) most candidates correctly stated and gave long appropriate examples of the other subsystems of the hardware component of a computer system: **storage (main/primary and auxiliary/secondary), input, output and communication**. A few candidates confused the stages in data processing (data entry, collation, collection, analysis, documentation) as sub systems of the hardware component of a computer system. In addition, a few candidates gave CD and hard drive as an example of primary storage.

For part (b) (ii), some candidates lost marks for providing inadequate responses regarding the function of the subsystems. For example, the input subsystem not only accepts data but also converts the data into a form suitable for processing.

In Part (c) for the block diagram, some candidates used a single one-directional arrow rather a bi-directional arrow between main memory/primary storage or auxiliary/secondary storage and the processor. A few candidates drew diagrams on which the arrows were (1) pointing in the wrong direction between input and processor, or processor and output, and (2) connecting wrong pairs of subsystems e.g. input and output, and input and communication. Teachers must ensure that the candidates are made aware that these subsystems **cannot be directly linked to each other**. In addition, the role and function of the processor within the hardware component of a computer system must be underscored.

In Part (d) a number of candidates could not identify three health problems that could arise from the use of computer systems. A number of poor responses were given such as:

- Radiation Poisoning
- Repetitive Eye Injury
- Epilepsy
- Obesity
- Wrist Fracture
- Arthritis
- Finger Sprain
- Rising blood pressure
- Rising blood pressure due to malfunctioning

Examples of good responses were:

- Health Problem – Repetitive Strain Injury
Cause –repeating the same hand movements frequently or over prolonged periods of time
How the risk can be reduced – providing wrist support, varying work or taking regular breaks
- Health Problem – Headaches
Cause – the glare from the screen, a faulty monitor or light shining on the screen
How the risk can be reduced – use of anti-glare filter, adjusting or replacing faulty monitor, use of blinds or correct lighting, adjusting the distance between the monitor and line of vision.

Question 2

This question was designed to test candidates' knowledge and understanding of the software engineering process, data flow diagrams and types of information systems. Approximately thirty-five per cent of the candidates attempted this question. Most candidates performed below the acceptable level. Only four per cent of the candidates scored 20 or more marks.

In Part (a) the majority of the candidates scored on average three out of a total of six marks. They did not seem to have fully grasped an understanding of each phase in the software engineering process.

It is recommended that teachers carefully distinguished among the phases when transferring knowledge to their student. The teachers could also state/identify specific tasks and allow candidates to determine which phase is being implemented.

In Part (b) nearly all of the candidates were able to state four of the phases in the software engineering process. Some candidates mentioned feasibility study as one of the phases of the process; but were unable to articulate the difference between the feasibility study and the analysis phase. Also, most of the candidates were unable to explain clearly the function of each phase identified.

It is recommended that the teacher ensure that candidates understand that:

“The feasibility study focuses on how viable the information system is and if it is needed in the organization”, whereas, “The analysis phase focuses on gathering data on the current system to determine the problem that needs to be solved and the requirements of the proposed system.”

Additionally, teachers need to use learning strategies/methods that will allow candidates to be able to distinguish among the phases.

In Part (c) most candidates performed poorly. Many of the candidates answered the questions using a Level 1 data flow diagram. This was evident as the candidates included data stores and more than one process symbol in their diagrams. Additionally, a number of candidates used verbs in naming the data flows when only nouns were to be used. The candidates showed that they did have an understanding of how data should flow in the system.

It is recommended that the candidates be carefully taught how to distinguish between a Context Level diagram and a Level 1 diagram

In Part (d) the majority of candidates correctly identify each type of information system. However, a few candidates gave responses such as 'Regulate and Control System' or 'Control System' rather than 'Monitor and Control system'. Most candidates were not able to fully justify their choice.

It is recommended that the teachers ensure that candidates fully appreciate the function and need for the various types of information system.

SECTION II

INFORMATION PROCESSING AND PRESENTATION

Question 3

This question assessed the candidates' knowledge and understanding of the purpose and features of software productivity packages and of the different types of information systems. The item was attempted by approximately eighty percent of the candidates and was generally done at an acceptable level by most candidates. Approximately seven per cent of the candidates scored 20 or more marks.

In Part (a) (i), some candidates did not provide the generic names of the two other productivity tools such as spreadsheet, databases, graphics, etcetera that could be found in Office suites but rather they gave named examples of these tools – Microsoft Access, Microsoft Excel, being two examples. Candidates' responses should be guided by the information given in the stem of a question, which cited word processor as an example. A few candidates listed tools that are generally not a part of any office suite - desktop publisher.

For part (ii), most candidates could not name office suites: Corel's WordPerfect Office, Open Office, Star Office, and Lotus Smart Suite. Rather, they named productivity tools that make up part of a suite such as Lotus 1-2-3, Microsoft Access, Microsoft Excel, etcetera. A few candidates gave answers such as general purpose, customized software packages and operating systems.

It is recommended that teachers should ensure that candidates know at least four suites and what is contained within each suite. This can be done through research or via presentations.

In Part (b) generally well done by most candidates. However, a number of the candidates provided responses expected at the CSEC level rather than at the CAPE level. For example, the use of different font sizes to make the advert appealing. A more appropriate response is "insert images of bouquets/balloons in the advert to make it eye catching and to depict the type of arrangements that are available to customers" or "use of the spelling and grammar feature to ensure that the advert would be error free and show professionalism"

Part (c) was generally poorly done by the majority of candidates. Most candidates' responses revealed their lack of exposure to and familiarity with the desktop publishing package and, as a result, their inability to distinctly state the advantages and disadvantages. In addition, this unfamiliarity caused them to confuse the advantages and disadvantages, using them interchangeably. Most responses indicated that the candidates did not realize that there ought to be a comparison between the two packages as they stated the same features for both software packages. Only a few candidates appeared to have had knowledge of the differences between both word processor and DTP. These candidates were able to discuss advantages of DTP over word processing such as:

- Flexibility in formatting and aligning blocks of text on a page around graphics, using different orientation of texts.
- The page layout feature of the DTP, which allows each page to be formatted differently, and which would be harder to be accomplished when using a word processor.

It is recommended that teachers expose candidates to the DTP package not just in theory but also, through practical exercises both in and outside of class. This will allow them to become more aware of what tasks can be done using this package. They could also be asked to produce business documents for an exhibition (e.g., a Business Expo).

Part (d) most candidates were able to correctly identify software package most appropriate to use in performing a given task. However, several of them were unable to justify their response.

Question 4

The question examined candidates' ability to apply their knowledge and understanding of database concepts to a given scenario. Approximately twenty percent of the candidates did this question. Most candidates performed below the acceptable level. The responses of most candidates indicated a lack of knowledge and understanding of key database concepts. Only one candidate scored above 20 marks.

In Part (a) (i), most candidates gave a poor definition of a primary key; evidenced by the absence of keywords such as attribute/field, unique, and row. In addition, a few responses of the definition referred to the use of the primary key, e.g., "primary keys are used for creating relationships/links", rather than defining the term.

Most candidates were able to identify the primary key within each of the tables for part (ii). In some instances the primary key was combined with another attribute unnecessarily, for example, Item_code + Supplier_code in the Item table.

In parts (iii) and (iv), it appeared that a number of candidates did not understand the questions and so could not offer suitable responses. Candidates were unaware that links are due to the existence of relationships between tables, and that the nature of the relationships between tables may be one-to-one (1:1), one-to-many or many-to-one (1:M) and many-to-many (M:M) and are based on certain assumptions. For example, for part (iv), if the key fields of the item table and the supplier table are item_code and supplier_code, respectively, then the relationship between tables is one-to-one, and the assumption therefore was that an item is supplied by only one supplier.

Part (b) was generally poorly done by most candidates. In most cases, data values were confused with attribute/data names. For example, data values such as “luxury item”, and “non-taxable item” were all listed as attribute names. The attribute and table names should be indicative to the data that they hold. A suggested response for the table is as follow:

Tax table

Tax_code
Tax_description
Tax_rate

In Part (c) most candidates did not perform well. Generally the candidates listed features of the package, but did not show how each could be an advantage/disadvantage. For example, queries and reports were stated as advantages of the database package. Although both features are also available in a spreadsheet package, to build a query or generate different reports from a single worksheet in a spreadsheet is not as easy to do as in a database. Therefore, ease of use would actually be the real advantage of the database package compared to the spreadsheet package for building queries and generating multiple reports. Other advantages include minimising redundancy of data, faster retrieval of information based on specified criteria, and ensuring data consistency. Regarding disadvantage, database packages do not allow for automatic recalculation when data values are changed, or ‘what if’ scenarios.

Part (d) was generally done well by most candidates, as they were able to identify the appropriate package. The justification however, for candidates at this level, lacked depth.

SECTION III

INFORMATION AND COMMUNICATION SKILLS

Question 5

This question was designed to test the candidates’ understanding and knowledge of wireless communications. The question was attempted by approximately 60 per cent of the candidates. Most candidates performed poorly. Only two per cent of the candidates scored 20 or more marks.

Part (a) most candidates were able to get two (2) of the four (4) marks allotted for this part of the question. Candidates’ responses kept repeating parts of the question itself, for:

“Wireless communication is communication that does not use physical means such as wires. It uses the atmospheres or air to transmit data or information.”

However, a more appropriate response would have been:

“The system where data or information is transmitted using radio frequency, infrared or other types of electromagnetic or acoustic waves, instead of wires or cables.”

Part (b) although most candidates were able to correctly identify two (2) devices, other than the computer, that operate using wireless communication technology, a number of them listed the telephone and intangible aspects of wireless communication (such as Bluetooth and infrared) as examples of wireless devices. Bluetooth and infrared are not devices. Bluetooth is a standard and communications protocol for personal area networks (limited range), whereas, infrared is an invisible band of radiation at the lower end of the visible light spectrum. Ideal responses of devices that operate using wireless communication would include:

- Cell phones (cellular)
- Radios
- Two-way radios
- Beepers or pagers
- Televisions
- Television remote controls
- Satellite phones

In Part (c) was generally poorly done by most candidates. Many candidates were able to identify devices that would facilitate access to the Internet, but failed to emphasize the wireless aspect, giving responses such as modem, network interface cards, router and adapter. Ideal responses would have been wireless modem, wireless card, wireless router, wireless adapter and microwave antenna or transmitter.

In Part (d) was generally well done by most candidates, who gave responses with appropriate justification, such as:

- Greater accessibility
- Mobility/portability (ability to move around without cables hampering movements)
- Not as much need for cables

However some candidates indicated that wireless communication was cheaper to use than traditional communication, which was incorrect.

In Part (e) the candidates failed to recognise the question also required a comparison with more traditional forms of access. As a result, most candidates gained only half of the marks allotted. With this oversight by the candidates, their responses in terms of identification of problems from a wireless standpoint could also be found under the traditional means of communication as well. The more appropriate responses would include:

- Relatively more expensive than traditional communication
- Harmful rays from radiation
- More security issues
- Clustering of ground space.

Question 6

This question was attempted by forty percent of the candidates. It assessed candidates' ability to demonstrate their understanding and knowledge of the characteristics and categories of information. This question was generally satisfactorily done by most candidates. Approximately 18 per cent of the candidates scored 20 or more marks.

Part (a) most candidates were able to identify four characteristics of information. However, few candidates confused the characteristics of information with the characteristics of information sources: currency, availability and breadth of coverage. Appropriate responses include accuracy, incomprehensibility, lifespan and relevance.

Part (b) a few of the candidates did poorly in this section. As stated in part (a), the responses referred to the sources of information source rather than the information itself. Some of the examples given to show the importance of the characteristics when evaluating information were poor. For example,

“If information is accurate it must be from a source which is verified and have some experience on the topic of the information.”

A good example of the characteristic – lifespan – is

“When dealing with the stock market, the lifespan of information is very important since stock values quoted are constantly changing. Therefore, information pertaining to share values of stocks last week will not be useful in making buy-or-sell decisions today”.

Part (c) candidates performed better on this part of the question, indicating that they possessed adequate knowledge and understanding of the categories of information.

Part (d) this part was generally well done. Some candidates misinterpreted the question and gave the characteristics of information as answers.

PAPER 03/1

INTERNAL ASSESSMENT

This project enabled candidates to examine the potential uses and issues related to a particular emerging technology, and to determine its applicability to their environment (school, community, country or the Caribbean region). Additionally, it enabled the candidates to demonstrate skills and competencies from each of three modules.

SECTION I

REVIEW OF EMERGING TECHNOLOGY

In most cases, this section of the IA was generally well done. Most candidates gave full descriptions of the technology, named and compared an existing technology and gave potential uses of the technology. However, some candidates misinterpreted the summary section, rather than summarizing section one; they gave summary of the data collected.

SECTION II

APPLICABILITY OF TECHNOLOGY

This section was generally not well done. Most candidates did not clearly identify the data types and information sources. The majority of those who did identify the data types and sources did not give any justification for their choice of data types or information sources. Data types refer to text, date, alphanumeric, and so on.

With regard to data collection methods, it was observed that the majority of the candidates were not clear on the data collection methods. Some candidates completely omitted this section from the IA. Others mentioned one of two methods, questionnaires and interviews. **Other data collection methods that could be included are observation, investigation/reviewing documents and research.**

Some candidates failed to mention the types of data processing methods they employed, and whether the method is manual or automated. In addition, most candidates mixed up the data analysis methods with the data processing methods as they mentioned the use of charts, graphs and tables as data processing methods. Data processing methods include spreadsheet, word processor, database, SPSS whereas data analysis methods include the use of charts, graphs, tables, making comparisons, interpretations and tendencies based on observation.

SECTION III

SUMMARY OF RESEARCH

This section was poorly done. Several projects lacked proper analysis. In a few instances, no analysis was done.

There were instances where the candidates failed to:

- state the problems they encountered,
- give summary of data analysis findings,
- identify possible follow-up projects or
- make appropriate recommendations.

However, despite this failing, teachers allotted marks.

Many candidates summarized the data, placing them in charts and tables, but failed to give an interpretation or explanation of what the data represent or how the findings would assist in determining the applicability of the technologies in their environment.

Note must also be made to the fact that several candidates use content straight from the Internet, without giving credit in references. Also, a number of the candidates failed to submit the project in the appropriate format; there were no headings, table of contents and bibliography.

Candidates should be reminded that the Layout of References must be done using the APA or MLA style and that **all** references used (including personal contacts) should be listed.

PAPER 3/2

ALTERNATE PAPER

SECTION I

REVIEW OF EMERGING TECHNOLOGY

The question tested candidates' knowledge and understanding of the emerging technology that they studied. Most candidates performed poorly.

In Part (a), most candidates identified the emerging technology but did not provide a description of the technology.

In Part (b), most candidates simply stated an intended purpose of the technology. There was no discussion regarding the intended purpose. In addition, they failed to indicate the level of success and general impact of the technology on societies.

In Part (c), most candidates responded with a statement or partial discussion of each potential benefit.

SECTION II

APPLICABILITY OF TECHNOLOGY

The question assessed candidates' knowledge and understanding of data collection and analysis methods that may be used in determining the applicability of the emerging technology in their environment. Most candidates performed poorly.

The candidates' responses suggested an unawareness of the following:

- The pros and cons of the various data collection methods – questionnaires; interviews; observation; investigation/research;
- Validation and Verification methods that may be used when collecting certain types of data;
- Data analysis methods – the use of graph, charts, tables, etc to discover trends and patterns.

Therefore, the basis of their discussion and explanation by the candidates was flawed.

SECTION III

INFORMATION AND COMMUNICATION SKILLS

The question tested candidates' knowledge and understanding of IT tools which could be used to communicate the findings of the research to particular target groups. Most candidates did poorly.

Most candidates described features of the tools identified in Part (a), rather than to show **how** they would use the features of the tools to present the information relating to the findings to the Public. Discussion of the problems when using a tool was, to a large extent, not organised, or merely simply a statement of problem.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2009**

INFORMATION TECHNOLOGY

INFORMATION TECHNOLOGY
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
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GENERAL COMMENTS

This was the first sitting of the examination under the revised syllabus, which included the introduction of Unit 2. The Information Technology syllabus comprises two Units, each consisting of three Modules:

Unit 1 – Information Technology Theory

- Module 1 - Fundamentals of Information Technology
- Module 2 - Information Technology Systems
- Module 3 - Information and Problem Solving

Unit 2 - Application and Implication

- Module 1 - Information Management
- Module 2 - Use of Information Technology Tools
- Module 3 - Social, Organizational and Personal Issues

This year, there was a candidate entry of 940 candidates for Unit 1, a 55 per cent increase over the 2008 entry. There were 150 candidates registered for the Unit 2 examination.

The overall performance of candidates in both Units was fair only, although there was an improved performance in Paper 03/2 of Unit 1.

DETAILED COMMENTS

UNIT 1

PAPER 01

Paper 01 comprised 45 multiple-choice items, with 15 items based on each Module. The candidates performed satisfactorily with a mean score of 24 out of a possible 45.

PAPER 02

SECTION I

Paper 02 comprised nine compulsory questions, three testing each Module. The mean mark on this paper was 44.7 out of a possible 150.

MODULE 1

Fundamentals of Information Technology

Question 1

The question was designed to test the candidates' understanding of the concepts of "Information Technology" and "data". The mean mark was 4.1 out of 15.

A number of candidates gave inappropriate responses to Part (a) and were not able to correctly give an example to demonstrate their understanding of the discipline "Information Technology". However, some candidates responded appropriately by stating that Information Technology is an integration of computer technology and information processing. An example would be a Human Resource Management System that captures, stores and manipulates employee data.

In Part (b), many of the candidates were not able to properly identify or discuss ways in which Information Technology can provide timely delivery of services. The phrase "delivery of services" was interpreted to mean the physical delivery of goods. Some examples of "timely delivery of services" are the use of:

- Search engines to gather data/information on a particular topic for a class assignment
- The Internet by the school administration to make utility bill payments or place an order with a supplier
- Online banking application by the school administration to query accounts' balances or transfer funds from one account to another
- Web-based teaching resources and multimedia tools for presentations
- Electronic collaborative tools by students located in different Caribbean territories to work on projects

The majority of candidates gave appropriate responses to explain the two types of data. However, a few candidates gave explanation in terms of the characteristics of the data. For example, some candidates explained qualitative data as being "complete", "accurate" and so on, and quantitative as being "one of high value". Candidates, who gave correct responses stated the following:

- Qualitative data are descriptive and are usually subjective or opinion based.
- Quantitative data are measurement based and are usually objective.

The performance on Part (c) (ii) was satisfactory and the candidates were able to identify appropriate pieces of data that could be found on the website.

Recommendations to the teachers:

It must be emphasized that students pay close attention to the fundamental concepts of Information Technology. Specifically, students should understand the terms and be able to give examples, when necessary.

Question 2

This question assessed candidates' knowledge and understanding of the information processing and in particular, the input-processing-output relationship. The mean mark was 7.0 out of 15.

For Part (a), the scenarios developed by candidates to show the input-processing-output relationship were inadequate, for example, “the keying/typing a report”. In addition, most examples were not relevant to the information-processing model (data → processing → information). In their responses, the candidates were required to give an illustration which involved the “transformation” of data into information. For example, “the subject teacher added the scores that a student obtained for class work, weekly and in end-of-term tests to find the final average.” The “input” is the individual student’s scores, the “processing” is the addition (calculation), and the “output” is the student’s final average. Another example of the relationship is illustrated by “a movie (output), which is generated from thousands of frames of images, sound and texts (input) played at a particular speed (processing)”.

For Part (b), those candidates who gave correct responses in Part (a) were able to state the importance of the information (output). Using the example above, the teacher is able to identify those students would need extra lessons on the material covered in the school term, that is, it would assist in **informing the teacher of an action to be taken or a decision to be made.**

For Part (c), most candidates performed satisfactorily as they were able to identify appropriate productivity tools and associated features/functions that could be used to perform the various steps of the manual system. For example, some candidates stated that the clinic could use a row in a worksheet (spreadsheet) or create a table (word processor) to capture the data about each animal.

Recommendations to the teachers

1. Use scenarios to illustrate the input-process-output relationship.
2. Encourage candidates to identify areas in their community or society that are involved in information processing.
3. Present a list of different scenarios and ask candidates to select the most appropriate or relevant scenarios, giving reasons why the scenarios are relevant/not relevant to information processing.
4. Review the use and function of the various productivity tools.

Question 3

This question was designed to test candidates’ knowledge and understanding of tools used in the entry, processing, storage and retrieval of information and their ability to justify the choice of these tools. The mean mark was 5.9 out of 20.

In Part (a), most candidates simply stated that wikis and online libraries were “web-based resources”, which was given as a part of the question.

In Part (b), while most candidates were aware that anyone, from a subject expert to a layman, could make an entry on a wiki, they were unable to explain that this would be a disadvantage of using wikis as references and thereby justify the position taken by universities.

In Part (c), most candidates were able to list three information technology tools and provide an appropriate example of each tool. However, a few candidates misunderstood the question and therefore gave responses such as “interview”, “observation and questionnaire”. For Part (c) (iii), a number of candidates identified uses of the tools that were not applicable to the tasks performed in the Accounts Department.

Recommendations to the teachers

1. Teachers should encourage students to use technical key phrases or words when explaining or defining a term and desist from writing in layman terms.
2. Compile a glossary on information technology terminologies, in particular, those found in the syllabus.
3. Facilitate regular class discussions, presentations and debates.
4. Encourage students to do extensive reading to widen their vocabulary.

SECTION II

MODULE 2

Information Technology Systems

Question 4

This question assessed the candidates' knowledge and understanding of the major components of an information technology system. The mean mark was 6.0 out of 15.

For Parts (a) and (b), most candidates gave the correct responses: Software, Network and Users (People) as the other three major components of IT systems. These candidates were also able to explain the purpose of the components and give an appropriate example of each component. However, a few candidates incorrectly listed devices and IT terminologies as the other components of IT Systems, for example, monitor, keyboard, hard drive, CPU, authentication, primary and secondary storage, communicative device, processing, storage, input, output, information, and memory.

For Part (c), most candidates explained the purpose of input and output devices in general, rather than explaining the two types of hardware in relation to a Point of Sale (POS) system. The candidates, who scored well explained that "in the POS system, input is provided through the cashier's keyboard, touch screen or barcode reader (**how**), which allows the item and/or its price to be entered (**reason**). Output in the POS system will include the monitor or printer (**how**) on which information related to the items being checked is displayed or printed (**reason**). It is of interest to note that even though "Point of Sale" was mentioned in the question, a number of candidates wrote "Point of Scale".

For Part (d), most candidates performed poorly. Their responses did not describe a situation but was simply a statement of a general nature, such as "the laser prints faster", "prints pictures", "prints large quantity" and "does high quality printing". For the dot matrix, inappropriate examples were "to print graphs and charts that require dots" and "cheaper". More suitable responses were:

- Dot matrix is more appropriate: Print in duplicate or triplicate on multi-part paper for customers' receipts where impact is needed.
- Laser printer is more appropriate: Printing the minutes of the meetings of the Board of Directors on cut-sheet paper.

Recommendations to the teachers

1. Stress the importance of reading the questions carefully before attempting to respond.
2. Compare and contrast the uses of various types of printers, describing scenarios in which one type of printer is more appropriate than another.

Question 5

This question examined the candidates' knowledge and understanding of software, the various types of automated information systems, and the software engineering process. The mean mark was 3.1 out of 15.

Part (a) was done satisfactorily, with most candidates achieving at least one mark. Some candidates gave appropriate examples of the application software, but could not properly state the function. For example, application software helps the user to carry out specific tasks using the computer.

Part (b) was very poorly done. Only a few candidates scored any of the available marks. Candidates misinterpreted the terminology "open source" to mean "allowing access to a company's data/information". As such, they discussed challenges that were not applicable to using open source software, for example, "users outside the organisation could tamper or hack into their system and change the data." Some challenges in relation to the use of open source software are:

- Deciding on which version to work with
- Deciding on how to obtain reliable updates, as no one is obligated to provide such updates
- Incompatibility with more popular proprietary software.

Responses to Part (c) were generally acceptable. Most candidates were able to give the name of two types of Information Systems (IS). However, some candidates could not explain the function or features of the IS so as to distinguish between the two types.

Based on their responses for Part (d), it would appear that most candidates were unaware of the activities done in the analysis stage of the software engineering process and, hence, the significance of this stage to the overall process.

Recommendations to the teachers

1. Discuss similarities and differences between major groups of software: Application and System (Operating Systems & Utilities).
2. Ask students to do research on the various stages of the software engineering process, paying particular attention to the major tasks (activities) to be done in each stage and the major outputs from each stage.

Question 6

The question was designed to assess candidates' knowledge and understanding of computer networks and the considerations that must be taken into account when developing human computer interfaces (HCIs). The mean mark was 5.7 out of 15.

In Part (a), most candidates did sketches of the network topologies and lost marks as there was no labelling and/or arrows to indicate the direction of the signals. Regarding the advantages and disadvantages of one topology when compared to another, most candidates were confused citing, for example, the advantage and disadvantage of the star to the bus, or vice versa.

In Part (b), most candidates seemed unaware of the existence of virtual private networks (VPNs) and spoke to the issue of local/wide area networks, in general. Hence they were unable to explain that the benefit of this particular type of network is the affordability of setting up a private network by tunnelling through the Internet practically free, hence being most cost-effective but secure.

In Part (c), most candidates were able to distinguish between different types of HCIs: menu-driven, command line, natural language, and so on. However, candidates could not identify particular user

characteristics: age, educational level, abilities, skills' level and culture. Also, they were unable to fully capitalize on the marks allocated, as their explanations were inadequate.

Recommendations to the teachers

1. Assign the students to research and make class presentations on the various networks and HCIs.
2. Discuss similarities and differences between the various types of network topologies.
3. Discuss similarities and differences between the various types of HCIs.

SECTION III

MODULE 3

Information and Problem Solving

Question 7

This question was designed to test the candidates' knowledge of the problem-solving process and ability to differentiate between programming languages. The mean mark was 3.8 out of 15.

In Part (a), a number of candidates confused the problem-solving process with the system engineering process. Further, too many candidates used single words, for example, "define/definition" and "analyse" rather than "define the problem" and "analyse the problem" in stating the stages of the problem-solving process.

In Part (b), most candidates gave the definition for an algorithm rather than focusing on the importance of the algorithm in the problem-solving process such as 'writing steps to solve the problem without worrying about the syntax rules (coding into a desired language)'.

The responses of most candidates in Part (c) were limited, suggesting that they were not aware of the properties of a well-designed algorithm.

In addition, several candidates gave unacceptable answers in Part (d). Furthermore, many candidates did not know that assembly language must also refer to the memory and register storage locations, using symbolic codes. Several candidates confused assembly language with machine language. Others gave an English language definition of 'assemble' and "procedure" instead of the technical meaning of these two terminologies.

Recommendation to the teachers

1. Discuss the strengths and weaknesses of the various generations of programming languages.

Question 8

This question assessed candidates' ability to develop and interpret algorithms. The mean mark was 3.3 out of 15.

In Part (a), many of the candidates gave a detailed explanation of the flowchart line by line, without identifying the problem that was solved. Further, a number of candidates did not recognize that

$\frac{Num}{2}$ has a remainder of 0 represented an 'even number'. Additionally, they did not recognize that

the flowchart added all even numbers between 0 and 100 inclusive and printed the total at the end of the iteration.

In Part (b), the assignment statements and print statement were included in the responses of most candidates. It was evident that most candidates did not understand the flowchart and correct conversion to pseudo code. Other challenges identified were:

- The statements were not logically sequenced
- Several candidates did not include a loop statement or attempted to use an IF statement for the looping structure
- A few candidates used English-like statements or narrative instead of pseudo code

Most of the candidates performed very poorly in Part (c). The most popular response was that an 'Endwhile' was needed so that the structure would not loop infinitely. Some candidates stated that the less than sign (<) needed to be changed to a greater than sign (>), not realizing that if this was the loop would not be performed at all and hence, the problem would not be solved. A limited number of candidates indicated that a 'for loop' was necessary without clearly stating how it could be used.

Recommendations to the teachers

1. Provide students with opportunities to analyse and dissect the problems that various algorithms are solving, to facilitate a better understanding and appreciation for developing algorithms to represent problem solutions.
2. Explain and illustrate how to convert a flowchart to pseudo code and vice versa.
3. Emphasize the diagrammatical differences between looping structures and selection structures.
4. Suggest the use of the 'arrow' as the assignment operator with emphasis on the direction in which it flows (that is, to the left (←)).
5. Trace algorithms with students and help them to identify the important components that allow the structure to loop.
6. Place more emphasis on the operation of the loops as it relates to the component that allows the loop to continue or discontinue (in this case the increment or counter).
7. Give students faulty algorithms involving loops for them to debug.

Question 9

This question was designed to test candidates' knowledge and understanding of the role of information in solving real-life problems, as well as using a specific tool for documenting the flow of information in an organization. The mean mark was 7.2 out of 20.

For Part (a), the majority of the candidates could not differentiate between each of the categories of information, namely, essential, desirable or cosmetic. Even when they categorized the given items correctly, many candidates were unable to justify the selection of their choices. Others were vague in their justification, providing cursory details to why they chose that category of information.

Several candidates seemed unaware that the selection of one of the types was based on the scenario, where the mortgage department wished to calculate the monthly payments based on life expectancy and the amount of money to be borrowed. Therefore, these candidates categorized the information given based on a general perception. For example, many candidates stated that the name of the applicant was essential, however, since the mortgage was based on life expectancy and amount to be borrowed, then name cannot be essential to the scenario; the name of applicant is desirable.

For Part (b), the responses were very limited, suggesting that these candidates did not have an in-depth understanding and familiarity with the symbols used in a data flow diagram (DFD). Many candidates drew sketches of symbols used in a flowchart and entity-relationship diagram (ERD). For example, the process symbol was , which is the flowcharting symbol used for a decision. Even where the correct symbols were drawn, the majority of candidates were unable to state the purpose of that particular symbol.

It should be noted that the majority of candidates in stating the purpose of a data store simply stated that it was used to store data, without adding that it stores the data/information for future use.

For Part (c), the responses by most candidates were generally satisfactory. Most candidates did not draw a context level diagram but did provide some level of DFD and were given credit.

Recommendations to the teachers

1. Use a variety of case studies from various organizations to enhance students' knowledge of real-life situations.
2. Make clear distinctions between the categories of information which will clarify all details before Case studies can be given.
3. Emphasis should be placed on the drawing of the DFD symbols correctly and clearly. Further, teachers should ensure that students understand the purpose of each of these symbols and be able to differentiate between DFD symbols and other tools used in IT.
4. Teachers should ensure that the students are able to differentiate between a context level DFD and a level 1 DFD.
5. Teachers should use a variety of exercises to ensure that students become familiar with constructing DFDs. This will enhance their logical and critical thinking skills.

PAPER 03/1

Internal Assessment

This project required candidates to demonstrate knowledge and understanding of the problem-solving process and display competence in examining potential solutions with the view of determining the most feasible solution. The projects were generally well done by most candidates. The mean mark was 37 out of a possible 60. The candidates who scored highly demonstrated the ability to:

- Select a topic based on the guidelines provided in the syllabus
- Collect and analyse data that identified the cause(s) of the problem being solved
- Thoroughly analyse the possible solutions
- Make recommendations that were supported by data
- Present a paper that was organized, well structured, and contained a cover, content page, abstract and layout of references using an acceptable style.

In addition, these candidates demonstrated mastery of the tools used to process and present their findings, draw Gantt charts, and prepare their final reports.

Problem Identification

Full marks were awarded for a complete and accurate description of the problem identified. Candidates who gained full marks in this section provided a background that established the context within which the problem occurred. From this background, the moderator was able to determine who the problem affected, the nature of the problem (performance, information, efficiency, control or security), its undesirable effects and who was seeking the solution. However, a few candidates were ambiguous in their problem description, which could have led to several interpretations.

A wide range of problems was identified, most of which were in the following categories:

- Communications (cross-border data sharing, and so on)
- Service delivery (sale of lunch tickets)
- Information storage and delivery (School registration, medical records, club membership)

A few projects identified problems well outside of the scope of the syllabus. One such project dealt with nanotechnology.

Gantt chart

Some candidates produced Gantt charts which did not include all stages of the problem solving process. In addition, in a number of diagrams, the labelling of axis and bars was omitted and the time frames indicated for some activities (tasks) were unrealistic.

Analysis of the Problem

Candidates were expected to use at least one fact-finding technique to collect data, conduct a thorough analysis of the data collected and establish one or more major cause of the problem.

Candidates who scored full marks:

- Applied at least three appropriate fact-finding techniques in the data collection process
- Processed quantitative data using a range of features provided by an electronic spreadsheet
- Analysed data in summary form to establish the cause(s) of the problem being studied.

Whilst interviews, questionnaires and observations were popular fact-finding techniques, not all of these were utilized appropriately.

Identification of Possible Solutions

This component required that candidates identify at least two **information technology** solutions. Candidates who scored highly provided details of how a particular tool or set of tools could be used to solve the problem identified. For example, instead of simply stating Microsoft Access, the student stated that “*a relational database management tool such as Microsoft Access be used to create an application that will be used by existing staff, after retraining, to record transactions, perform computations, and print on-demand reports*”.

Evaluation of Possible Solutions

This component required that candidates objectively evaluate two or more of the solutions identified. A few candidates scored full marks. These candidates undertook an evaluation of all or most of the following aspects of the possible solutions:

- Hardware tools (technological)
- Software tools (technological)

- Network and data communication services (technological)
- Costs such as acquisition/implementation and recurrent (financial)
- User issues such as recruitment, training needs, user interface (operational)
- Other issues such as legal, environment, and so on (operational)

Selection and Justification of Most Feasible Solution

This component required that candidates do a thorough analysis of the issues (technological, operational and financial) by comparing all possible solutions and make a selection of one of the solutions. The selection of the most feasible solution should take into consideration the resources required for implementation and those currently available. Generally, the analysis was limited and did not consider all the strategies recommended. Only a few candidates scored full marks.

Presentation and Communication of Information

Overall, the projects were well organized and structured. However, some candidates did not adhere to the rules stipulated by MLA or APA standards in their references. Candidates did not include an abstract in their report. Candidates need to pay attention to the table of contents by assigning correct page numbers to respective pages and including same in the table of contents or use the TOC feature of the word processor to generate one.

The following are recommended:

1. Ensure that the project report contains clearly defined, logically sequenced sections as suggested by the sub-headings in the mark scheme for internal assessment (syllabus document page 29).
2. The following items should be placed in the appendix:
 - Gantt chart
 - Data collection instruments (observation checklists, questionnaires, interview questions)
 - Data/information collected
 - Charts, graphs and summaries
3. Use appropriate features provided by the word-processor to prepare the project report. Some of these features that may be used are:

Editing tools	Tables, footnotes, APA/MLA references, table of contents
Proofing tools	Spell checker, grammar checker, word count

4. Concerning Gantt Charts: use the recommended textbook *Discovering Computers* by Shelly Cashman and Vermaat (or any other appropriate text) as a guide.

PAPER 03/2

ALTERNATIVE TO THE INTERNAL ASSESSMENT

This paper tested candidates' knowledge and understanding of a problem that they have examined and for which they were required to identify at least two possible solutions and then determine the most feasible solution. Most of the candidates performed at a satisfactory level.

Question 1

Most candidates were unable to develop good problem statements; the statements were either very vague or terse, for example, “poor bus system”, “new system not working”, “poor communication” and “long delay times when purchasing cellular phones”. Also, some candidates developed problem statements (such as “Alcoholism” and “Drug Abuse among Teenagers”) for which they were unable to identify IT-related solutions. An example of an appropriate problem statement would be “long queues of customers purchasing cellular phones”.

In Part (b), several candidates gave responses that were deemed to be outcomes rather than causes, suggesting some level of confusion in differentiating between the two. A cause is defined as “that which produces an effect”, whereas an outcome is defined as “a consequence”.

Using the problem statement cited above, possible causes of the problem are:

- Sales clerks complete application forms by hand.
- The application form consists of several pages.
- Inadequate number of sales clerks during peak times.
- Customers do not possess valid identification, which is required to finalize the sales agreement.

Possible outcomes of the problem are:

- Customers become frustrated or boisterous at the lengthy delay.
- Lost sales as customers leave without purchasing cellular phones.

In Part (c), a number of the candidates identified steps of the problem-solving process rather than those of the SDLC.

In Parts (d) and (e), based on their responses, most candidates did not appear to know what are the advantages and disadvantages of the various data gathering instruments such as questionnaire, interview and observation.

Question 2

Most candidates identified either only one possible solution to the problem or solutions that were deemed impractical. In evaluating the options, the candidates were expected to discuss the technological, financial and operational feasibility of each option, that is, what would be required in terms of resources in order to implement the option.

Question 3

Most candidates performed unsatisfactorily on this question. In Part (b), the candidates did not provide any comparison of the options in relation to the current environment in terms of constraints. For example: Are financing and other relevant resources available? Which option is feasible when all constraints are considered?

In Part (c), the majority of candidates produced cover pages that

- Had no title
- Were very cluttered, with poor use of white space
- Were not balanced and the organization of the content haphazard
- Had no graphics
- Had no variation in font size.

UNIT 2

PAPER 01

Paper 01 comprised 45 multiple-choice items, with 15 items based on each Module. The candidates performed satisfactorily with a mean score of 26 out of a possible 45.

PAPER 02

SECTION I

Paper 02 comprised nine compulsory questions, three testing each Module. The mean mark on this paper was 52.4 out of a possible 150.

MODULE 1

Information Management

Question 1

This question examined candidates' knowledge and understanding of the various formats of data and how data storage has changed over time. The mean mark was 6.3 out of 15.

In Part (a), most candidates were able to identify three formats in which data may be stored. A few candidates gave examples such as graphs, charts or Microsoft Word and Excel, which showed that they misunderstood the question.

In Part (b), most candidates were able to identify relevant criteria for choosing a storage media, for example:

- Storage capacity
- Cost
- Portability
- Access method (sequential, random or dynamic)
- Non-volatility
- Compatibility with existing device
- Durability

Some candidates gave incorrect responses such as accuracy, reliability and flexibility.

In Part (c), most candidates identified situations where the use of CD-RW or DVD-RW was preferred over hard disk storage, but they were not able to give a suitable. Some candidates were unsure about the situations where the use of CD-RW or DVD-RW would be preferred over a disk for storage and wrote incorrect statements such as:

1. CD-RW and DVD-RW hold more information than a hard drive.
2. Information on a hard disk cannot be changed.

In Part (d), most candidates were aware that a compression utility should be executed before the file could be copied to the diskette. However, most of the candidates could not provide any justification, that is, the compression utility "transforms data from one representation to another smaller representation, thereby reducing the size of the original file".

Recommendations to the teachers

1. Review different file formats, other than text-based format.
2. Teachers should ensure that students can identify and justify situations where one storage medium is preferred over another.
3. Discuss various data compression utilities.

Question 2

The question was designed to assess candidates' knowledge and understanding of the differences between flat files and databases, of file organisation methods, and the risks that companies might face in managing their own data. The mean mark was 2.6 out of 15.

The responses for Part (a) were extremely limited, which suggested that most of the candidates were not fully aware of the advantages of using relational databases instead of flat files for storage and retrieval of data.

In Part (b), the majority of the candidates were not able to discuss the two file organization methods that are possible with disk storage, but not with tape storage. Most candidates merely stated the two methods – direct or random and indexed sequential, but did not give any description of the file organization nor did they differentiate between the two methods.

In Part (c), candidates were able to list two concerns (other than data security) that a company may have regarding its data. However, very few candidates highlighted the possible implications for the company and most of the candidates provided only partial strategies that the company could implement in order to minimize risks associated with the concerns identified. For example, to minimise data loss, a company should not only back up its data to an external storage device, but should also secure/safeguard the storage medium from any possible damage either off-site or in a vault.

Recommendations to the teachers

1. Teachers should encourage students to make extensive use of the Internet and invite resource persons to present on specific areas of specialty.
2. Teachers should incorporate guided discussions on relevant topics in the instructional process.
3. Students should be required to create different types of databases and make comparisons between them.

Question 3

The question assessed the candidates' ability to explain data validation strategies in relation to database, explain the concept of normalization and apply normalization rules to remove normal form violations. The mean mark was 6.4 out of 20.

The majority of the candidates were not able to identify the types of validation checks required in Part (a). Suitable responses include: range check, presence check, format check; look-up list check. Most of the candidates did not identify the data field on which the validation check was being done and, therefore, the responses were general rather than specific. Examples of good responses were:

- Date Hired and Date Returned: A format check can be made to ensure that there is consistency and that the data in each field is entered as DD/MM/YY
- Client Number: A presence check may be used to ensure that this field does not have a NULL value or is left empty.

- M/V Registration: A length check (format) can be used to ensure that any information entered does not exceed the required number of characters.

The responses to Parts (b) and (c) suggested that a limited number of candidates was familiar with the terms un-normalised and normalisation. Although some candidates were able to identify normalisation as a process or set of rules that remove or minimize redundancies and anomalies, only a few candidates alluded to the fact that normalisation ensures that the database is structured in the most efficient manner.

In Part (d), the majority of the candidates included partial dependent and non-key dependent attributes in their responses of 3NF relations, suggesting that they did not know the rules applicable to the normalisation process.

Recommendations to the teachers

1. Teachers should discuss the various types of validation checks. It is important that appropriate examples from various scenarios are used to identify which fields and possible validation checks can be used.
2. Both the table structure and standard notation should be used to illustrate database relations in the un-normalised and normalised forms.
3. Teachers should provide opportunities for students to normalise relations, ensuring that the students can identify the particular anomalies and violations when moving from the un-normalised relations to the 3NF.

SECTION II

MODULE 2

Use of Information Technology Tools

Question 4

This question was designed to test candidates' ability to use their knowledge and understanding of popular productivity tools and apply their use in various situations. The mean mark was 6.9 out of 15.

In Part (a), most candidates correctly identified three generic software tools that should be installed on the laptops.

In Part (b), the majority of candidates were able to explain how the tools identified in Part (a) could be used to assist the staff in its effort to provide humanitarian aid. However, some candidates explained how the tool is used in a general way, but did not link it to activities done by the charity organization. A more appropriate response, for example, was "use the database management system to track the inventory of emergency supplies at their various locations worldwide" or "use the word processor to produce reports regarding the organisation's effort in the most recent disaster".

In Part (c), there were some candidates who were unable to integrate the software tool. Most candidates spoke generally about integration and failed to identify the two software tools and show the steps to transfer data from one to the other.

Recommendations to the teachers

1. Teachers should describe situations from the school or community experience and demonstrate how popular productivity tools can be used by persons to perform specific tasks. For example, use the tools to create posters, store the results of events, and so on, for the School's Sports Day.
2. Teachers should demonstrate how data from one software tool can be integrated with data in another by using the export and import or copy and paste features. The advantages and disadvantages of the methods should also be reviewed.

Question 5

This question examined candidates' knowledge of information sources and their ability to critically evaluate pieces of information based on the sources of the information come. The mean mark was 6.3 out of 15.

Part (a) was well done by the majority of the candidates. However, a few candidates confused information sources with tools used for data gathering such as interviews, questionnaires and observations.

While Part (b) was done satisfactorily by most candidates, several candidates simply stated the situation, for example, "A student uses the Internet to do his research", but offered no explanation why the Internet would be considered an appropriate source.

Part (c) was poorly done by most candidates. Some candidates confused the characteristics of information with the criteria for accepting/rejecting pieces of information based on the evaluation of the information source. Regarding Part (c)(iii), a number of candidates viewed the Internet (website) as being reliable as an information source, indicating that they are unfamiliar with the pitfalls associated with the Internet (website) in relation to information sources.

Recommendations to the teachers

1. Students must become more aware of the jargon that must be used through familiarity with syllabus.
2. Students must be given information from various sources and allowed to evaluate the sources using the criteria listed in the syllabus. This should include evaluation of information on select websites.

Question 6

This question examined candidates' knowledge and understanding of the features and functions of spreadsheet applications, as well as their ability to use the application to provide the solution to a problem. The mean mark was 4.8 out of 20.

For Part (a), most candidates were not able to identify features, other than general formatting features such as bold and font size, of the spreadsheet application that the teacher used in developing the given worksheet. Some features include:

- Cell formatting (decimal places)
- Merge and Centre
- Functions/formulae (to perform calculations)
- Cell referencing
- Copy and paste/Drag and drop
- Word wrap
- Conditional formatting

Parts (b) and (c) presented a challenge to candidates as they did not identify the correct built-in function, COUNTIF, and were not able to describe the steps that the teacher would perform to generate the results of the COUNTIF function.

While the majority of the candidates performed satisfactorily in Part (d), some candidates incorrectly placed the image and the headings. In addition, a few candidates used a **numbered** list for the training courses.

Recommendations to the teachers

1. In addition to the basic spreadsheet features and functions, students should be exposed to the advanced features and functions available within the application to assist in providing solutions to problems.

SECTION III

MODULE 3

Social, Organizational and Personal Issues

Question 7

This question was designed to examine candidates' knowledge and understanding of the ways Information Technology impacts on the society, with particular consideration to the introduction of a new information system in an organization. The question also sought to test the candidates' ability to examine potential threats or vulnerabilities faced by an organization when employees are allowed access to the Internet and to develop appropriate mitigation strategies for countering these threats. The mean mark was 8.1 out of 15.

In Part (a), several candidates experienced difficulty in stating the changes, from an employee's perspective, that may arise from the introduction of an information system. Although some candidates understood what the question required, they were unable to clearly state their response. For example, several candidates answered using one-word responses such as "accuracy", "efficiency", "reliability", or "speed".

In Part (b), the majority of candidates gave partial explanations of the possible effects that can be experienced from the changes identified in Part (a). Candidates seemed unable to develop strong explanations of their effects on an employee of the company.

In Part (c), most candidates provided a simple statement, typically defining the threat (terminology) without supporting the answer with a reason or explanation as to why the matter is considered a threat to the company. Threats or vulnerabilities pose a serious challenge to the security and integrity of company's data and consequentially their information. Therefore, any discussion must include the possible impact of risks associated with the threats.

In Part (d), good and valid suggestions were made, as most candidates were able to correctly identify a strategy for countering the threat or vulnerability identified in Part (c). For example, if the threat was "employees would be using the computer for their personal gain", then candidates stated that the strategy to be implemented would be to monitor the websites that the employees access and block any website deemed inappropriate.

Recommendations to the teachers

1. Teachers should use case studies to assist students in understanding the various risks to entities and individuals.
2. Teachers should practise responses to questions with the students to ensure that students understand the type of response required when the terms such as “state”, “discuss” and “explain” are used.
3. Students should be encouraged to work in cooperative groups when conducting research on particular topics in the syllabus.
4. Teachers should provide students with exercises on the topics of impact of IT on society and threats/vulnerabilities.

Question 8

This question examined candidates’ knowledge and understanding of the danger and risks posed by natural and other disasters to ICT systems in Caribbean countries, as well as a mitigation strategy – disaster recovery plan. The mean mark was 7.4 out of 15.

The first part of the question was generally well done by most candidates as they were able to identify three hazards that may occur in the Caribbean and which may pose a danger to ICT systems.

In Part (b), most candidates provided limited responses such as “damage to computer systems from flooding” and “corrupt data due to power spike”, with no further explanation as why these are considered serious risks. Such risks could result in loss of revenue for a company due to either lengthy downtime of the ICT system or customers taking their business to competitors arising if inaccurate or delayed billing is produced. Several candidates interpreted the question by looking at risks caused by ICT systems instead of risks that create problems for ICT systems. However, most candidates performed fairly well.

Generally most candidates performed satisfactorily in part (c), identifying appropriate strategies to counter the risks given in Part (b). Responses included: installation of an uninterruptible power supply (UPS), unplugging or turning off computers at the end of the day and limiting use of computers during natural disasters.

The responses to Part (d) suggested that most candidates did not know what a disaster recovery plan was. Several stated that a disaster recovery plan should be implemented after the occurrence of a disaster. A more appropriate answer should have stated that this is a written plan describing the steps or actions a company would take to restore its computer operations in the event of a disaster. A proper plan should contain four major components: emergency plan, back up plan, recovery plan and test plan.

Recommendations to the teachers

1. Teachers should incorporate appropriate case studies in the instructional process to assist students in answering questions of this type.
2. Teachers should write persons from the business community to discuss their disaster recovery plans with the students.

Question 9

This question was designed to test the candidates’ knowledge and understanding of legal and ethical dilemmas that organizations and individuals may face arising from the use of IT systems. The mean mark was 5.4 out of 20.

In Part (a), a limited number of candidates responded correctly when asked to explain the term “copyright”. They stated that it is the right to control or produce and also made reference to the legal aspect of it. However, some of the candidates were unable to correctly explain the terminology and

mainly referred to copyright as an illegal act. In relation to “information privacy”, most of the candidates indicated a basic knowledge of the right to deny or restrict access to information. However, the important component that speaks to the unauthorized collection and use of that information was omitted.

In Part (b), many of the candidates were able to describe a situation where it would be legally permissible to reproduce copyrighted material without the expressed approval of the holder. The most popular answers included:

- Time limit
- One back-up copy
- Limited number of pages
- Acknowledging the source

The phrase “without the expressed approval of the holder” was ignored by most of the candidates.

In Part (c), the majority of the candidates were able to adequately state how the malware could have been avoided, but were unable to correctly identify the type of malware. The majority of the candidates stated that the malware was a virus.

Only a few candidates were able to gain maximum marks in Part (d). A number of candidates were able to correctly identify that the breach of the copyright law given in the scenario as “plagiarism”. However, the possible actions to be taken by the tutor were not properly addressed. The candidates mainly stated negative consequences of Alicia’s act.

Recommendations to the teachers

1. Invite guest speakers who deal with these legal concepts on a regular basis. In addition, allow students to copyright original work done and initiate a discussion on the importance of copyright to their work and ideas. Additionally, an in depth research on “copyright law” will facilitate a better understanding of the situations in which it is legally permissible to reproduce copyrighted material without the expressed approval of the holder.
2. Teachers should ensure that the students identify important keywords given in questions, as this will guide them into answering questions correctly.
3. Concerning malware, use scenarios and case studies to help students in identifying which types of malware have been activated and justifying the answers given, so that valid solutions or avoidance strategies can be recommended.

PAPER 03/1

Internal Assessment

This project enabled candidates to demonstrate their skills and competence in using IT tools to assist them in developing a solution to a problem. The performance of the candidates was moderate. The mean mark was 28 out of a possible 60.

Problem identification

Full marks were awarded for a complete and accurate description of the problem identified. Candidates who scored well provided a background that established the context within which the problem occurred. From this background, the moderator was able to determine who the problem affected, the nature of the problem, its undesirable effects and who was seeking the solution. However, most candidates merely wrote a single sentence for the problem, providing no background

in which the problem occurred. In addition, a few candidates were ambiguous in their problem description, which could have resulted in several interpretations.

A range of problems was identified such as:

- Inventory (receiving and distributing items such as schools’ supplies, music CDs, movie DVDs)
- Registration (school, health centre)

Analysis of the Problem

Most candidates did not describe their findings from the various data-gathering activities done. In the analysis phase, candidates were expected to conduct a study of the problem, using two or more tools (questionnaires, interviews, observation and review of documentation) to determine what the facts/issues were concerning the problem. This would assist the candidates to identify the actual causes of the problem, rather than persons’ perceptions. This phase also affords candidates the opportunity to refine the problem statement.

A few candidates included a justification of the data-gathering tools used. However, this is not required.

Identification and Justification of IT Tools

Candidates were required to use productivity tools and/or web pages to implement their solutions. Although most candidates were able to identify productivity tools that could be used to assist them to solve the problem, many were unable to adequately justify the use of these IT tools. A few candidates identified tools that are not in keeping with the requirements of the syllabus such as global positioning systems (GPS), networking and voice recognition systems.

Assessment of the Implications of the Solution

This section proved challenging to most candidates. A number of candidates provided statements on the issues, rather than a discussion of the issues. Only a few candidates mentioned strategies that could be employed to address the issues raised.

Implementation of the Solution

Appropriate Use of IT tools and their features

Most candidates’ use of the IT tools in implementing their solutions was appropriate. For example, the word processor was used to generate form letters and the spreadsheet application to “crunch” numbers. However, most candidates did not exploit the most appropriate features of the tool in implementing their solutions, especially, when using the database management system. No security features were in evidence, the “form” feature was not used for data entry and queries were not used to build reports.

Human Computer Interface

For the database or web page component, the solutions revealed limited use of navigational features and labelling. Some solutions did not employ navigational features or buttons, for example, tab keys, arrow keys, BACK, NEXT, PRINT, CLOSE.

Working Solution

Although the majority of the solutions were satisfactory, some of the solutions did not meet the minimum criteria as stipulated in the syllabus.

Recommendations to the teachers

1. Students should be encouraged to identify a problem that exists in their environment (school or community) and for which an IT-based solution is a feasible one.
2. Students should be encouraged to use features such as form, report and query when building databases.
3. To assist in the construction of web pages, students should refer to the recommended text, *Computer Concepts*, or any other suitable source for guidance.

PAPER 03/2**ALTERNATE TO THE INTERNAL ASSESSMENT**

This paper tested candidates' ability to apply appropriate features of software tools in developing the solution to a problem encountered in their environment (school or community).

Question 1

The candidates were unable to develop good problem statements. Their statements were either very vague or terse. Although the candidates could state two of the tools that could be used to assist them in thoroughly analysing the problem, they were unable to justify the use of the tools. In addition, they did not provide suitable responses regarding the limitations of the tools.

Question 2

Candidates performed at an acceptable level on Parts (a), (b) and (d), identifying two software applications, the features of the tools that could be used to assist them in developing their solution, as well as a limitation of one of the tools. However, in Part (c), the candidates were not able to justify their choices of features given in Part (c).

Question 3

Candidates were required to discuss issues and user requirements for human computer interfaces (HCIs) that ought to be addressed in order to ensure the successful implementation of their solution. Candidates performed unsatisfactorily as responses were generally statements rather than discussions or sound arguments.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
ADVANCED PROFICIENCY EXAMINATION
MAY/JUNE 2010**

INFORMATION TECHNOLOGY

GENERAL COMMENTS

This is the second year of the examinations based on the two-unit format. Approximately 1,270 and 450 candidates wrote the examinations for Units 1 and 2 respectively.

Ninety-three percent of the candidates who wrote the examination achieved acceptable grades in Unit 2 compared to 83 per cent in 2009. However, there was a decline in the performance for Unit 1 where 70 per cent achieved acceptable grades in 2010 compared with 83 per cent in 2009.

There was improved performance on Paper 01 and Paper 03/1 of Unit 2, but a significant decline on Paper 02 when compared with the previous year. The performance on Unit 1 showed a decline on all papers.

DETAILED COMMENTS

UNIT 1

Paper 01 – Multiple Choice

The paper comprised 45 items, with 15 items based on each module. Most candidates performed satisfactorily; the mean score was 22.5 out of a possible 45.

Items based on topics in Module 3 (Information and Problem Solving) posed a challenge for the majority of candidates.

Paper 02 – Structured Questions

The paper consisted of nine compulsory questions: three questions on each module. The mean score was 33.91 out of a possible 150.

It should be noted that generally many candidates performed well on two or three questions, but did very poorly on the other questions, as evidenced by high scores of over ten (out of 15) or over 15 (out of 20) on two or three questions but less than five on the remaining questions. This suggests that, for the majority of candidates, some sections of the syllabus content were either not covered or only given cursory treatment.

The majority of candidates have performed below the acceptable level on questions which assessed the higher order skills such as application, analysis, synthesis and evaluation. To address this, teachers are encouraged to include questions assessing the higher order skills on internal examination papers and assignments. It should be noted that a glossary of the terms is included in the syllabus.

In addition, teachers should encourage students to provide complete sentences for responses, where applicable, rather than one-word or short-phrase responses. Too often, the responses seem more appropriate for CSEC rather than the CAPE level.

Section I – Fundamentals of Information Technology

Question 1

The question was designed to test candidates' recall of facts regarding computing and its disciplines and data capture methods that could be used in getting data that was collected on questionnaires into an IT system. It also assessed their understanding of 'free text', the problems that could arise when using this format and the strategies to be employed so as to minimize the problems encountered. Most candidates performed below the acceptable level. The mean score was 4.15 out of 15.

Part (a) was well done by most candidates. Weaker candidates confused the disciplines of Computing with the types of Information Systems, among other incorrect responses.

Part (b) (i) seemed to have caused a great deal of misunderstanding for most candidates. They were required to say how the data collected on questionnaires could be entered into an automated information system. The candidates who scored zero gave responses such as the types of application software (for example, Microsoft Word, Excel, Access, PowerPoint, etc.) and data collection methods such as observation, surveys, interviews and questionnaires instead of actual data capture methods such as keying, scanning/bar code reading/Magnetic Ink Character Recognition (MICR), point-and-click, touch screen.

Part (b) (ii) was fairly well done by the candidates who correctly listed the data capture methods in Part (b) (i).

Part (b) (iii) was poorly done. Most of the candidates did not realize that the term 'free text' format meant respondents were not limited in what they could write as their answers. Incorrect responses included candidates referring to terms as 'a system/program used'. Some candidates stated that free text is done using a mobile phone which was not in keeping with the scenario described in the question.

The candidates who responded correctly cited problems such as

- Data entry personnel being unable to read what was written due to illegible writing by respondents
- The length of the field for data entry might be inadequate to allow for all that was written by respondents

Part (b) (iv) was also poorly done by most candidates. However, the candidates who responded correctly in Part (b) (iii) were able to suggest, for example, the use of small boxes for block letters, which would restrict respondents to one character per box; closed questions which limit respondents to a list of choices or options.

Recommendations

Teachers are encouraged to list the various hardware devices and ask students to match them to the relevant component of the automated information process: data capture or entry, process, storage. For each device, the students should then do research to determine the situation which is ideally suited for

the use of the particular tool and state, for example, when a keyboard should be used instead of a scanner to enter data into an IT system.

Question 2

This question tested candidates' knowledge of the tools/services associated with the Internet and broadband connectivity to the Internet. It also tested their ability to explain the meaning of terms related to telecommunications. Generally, the question was poorly done. The mean score was 2.68 out of 15.

In Part (a), candidates were expected to name services of the Internet, other than the World Wide Web. Most of the candidates correctly named one or two services. A number of them stated a purpose of the service, for example, sending email messages rather than stating that the service was email. Also, some candidates gave responses naming services of the World Wide Web (WWW) such as e-commerce (buying and selling, paying utility bills) and e-marketing. This indicated they were unclear as to what the WWW is. Other examples of services offered by the Internet are newsgroups, chat rooms, instant messaging, Internet telephony, file transfer protocol (FTP), telnet and search engines.

In Part (b), many candidates were not able to identify two high-speed broadband connections that a householder or small business may use to access the Internet. The majority of candidates gave 'modem' as an answer but were unable to distinguish between the different types of modems. Some candidates only listed the high-speed broadband connections but provided no further information about the connection. Some acceptable responses of high-speed broadband connections are *DSL*, *ADSL*, *cable modem*, *fixed wireless*, *WiFi*, *satellite modem* along with the description, cost and speed of connection.

In Part (c) (i), most responses were unsatisfactory. Candidates responded with teleconferencing or videoconferencing as a telecommunication strategy to allow staff to work at home. The correct response is either *telecommuting* or *virtual private network (VPN)*.

In Part (c) (ii), the majority of candidates gave at least one correct information technology (IT) tool or service that would allow the employee to work from home. Most candidates correctly stated a modem but were unable to correctly identify the other possible IT tools or services.

The majority of candidates gave emailing as the response to Part (c) (iii). A few candidates were able to identify file transfer protocol (FTP) as the Internet service which would allow the employee to work at home and download files from the file server at the office. They were unable to give a reasonable justification for the response.

Recommendations

1. Teachers are encouraged to distinguish between verbs such as *name*, *state*, *identify* and *list*.
2. Students should be asked to research the various services offered by the Internet and to provide a few examples of each service, or situations in which a particular type of Internet service would be most appropriate.

3. Teachers should present a list of different scenarios and ask students to select the broadband connection most appropriate to each scenario, giving reasons such as cost, speed and tools to justify their choice. They should also encourage the use of appropriate technical jargon or terms, where applicable.

Question 3

This question tested candidates' knowledge and understanding of the characteristics of information and the importance of these characteristics in decision making. Candidates were given a table detailing a number of ways in which information could be classified, along with the type and an explanation of information to be found for each category. Using the details in the table, candidates were required to categorize the information to be found on a purchase order which was generated by a company. The mean was 4.68 out of 20.

Part (a) was satisfactorily done. Weaker candidates gave responses which explained 'knowledge' in a general sense rather than within the context of IT.

Part (b) was poorly done. Many candidates simply gave the definition of the characteristics of information. The question required candidates to use an example which would demonstrate how the particular characteristic (or the lack thereof) could lead to good (or poor) decision making.

For Part (c) (i), some candidates misinterpreted the question and proceeded to give job positions found at the different management levels that were identified in the explanation.

Part (c) (ii) was generally well done by most candidates.

Part (c) (iii) was misunderstood by most candidates who felt they were to give the different forms of written or printed information. The more appropriate responses were *aural* (information that could be heard, for example, a song or speech) and *visual* (information that could be seen, not read, for example, a movie).

Recommendations

1. Teachers should facilitate class discussions on the characteristics of information and how these characteristics, when not considered by decision makers, could lead to significant damage or loss to the society, businesses or individuals.
2. Students should be assisted to identify ways in which to classify information and to provide explanations and examples of each. Using various forms generated by businesses and schools, teachers should ask students to examine these forms and classify the information found on them.

Section II - Information Technology Systems

Question 4

Candidates were required to apply their knowledge of the facts regarding the purpose, functions and types of software as they relate to utilities and in particular to drivers and security measures to secure IT systems and equipment. Candidates performed below the acceptable level. The mean was 5.47 out of 15.

In Part (a) (i), candidates appeared not to know the difference between the functions of the scanner driver as opposed to the functions of the scanner and, in many instances, they responded to the question by stating the functions of the scanner. Few candidates scored full marks on this question.

Part (a) (ii) yielded better responses. However, some candidates did not provide reasons regarding why the set of scanner drivers is not supplied on a floppy diskette. Most candidates gave responses which spoke to the issue of storage capacity but did not provide an explanation to support this as being an issue. An appropriate response would be, for example: *the set of drivers is not available on a floppy because the capacity of drivers is typically too large to fit on a single diskette, which has a storage capacity of only 1.44mb.*

Part (a) (iii) proved challenging for candidates. It required them to identify and discuss two other methods or ways a manufacturer may use to supply the scanner drivers to buyers. Most candidates identified several storage devices such as DVDs, flash drives and memory sticks as methods for supplying the software. The more appropriate responses were *to download the driver from the manufacturer's website; or to send the drivers as an attachment with an email message; or to have the drivers preloaded with the operating system.*

In Part (b) (i), most candidates were able to give one rule that a person should follow when creating a robust password. Candidates responded well to Part (b) (ii) and in most cases, demonstrated a general understanding of the question.

Recommendation

Students should be asked to research and discuss the various types of utility software along with the methods manufacturers/developers may use to ship the software to buyers.

Question 5

The question was designed to assess candidates' knowledge of the deliverables associated with the various stages of the system development life cycle (SDLC) as well as the features of menus and graphical user interfaces (GUIs) which are popular human computer interfaces (HCIs) used in IT systems. Candidates were also required to apply their knowledge of the features of the GUIs and the target audience to make the online booking process for a hotel simpler and user friendly. The mean was 1.88 out of 15.

In Part (a), candidates paid very little attention to the word *deliverables* used in the question. Most candidates knew the stages of the SDLC and what they entailed; however, they proceeded to list these stages without indicating the deliverables obtained at each of the given stages — only a few could name the deliverables. Verbs were used, indicating processes, rather than nouns. For example, prototyping as against a prototype and updating instead of updates. The fact that deliverables meant something tangible was not apparent. For example, a report, plan, or guide. In conclusion, candidates scored poorly on this part of the question since the deliverables and their corresponding stages were required. It meant also that they would not have earned the mark for giving a stage if the deliverable was incorrect.

In Part (b) (i), candidates were able to provide other situations/examples where menus were used as the HCI. However, the explanations why the menus were the main feature were inadequate. Most candidates did not recognize that they were asked to give the reason for their choice of menus, as the main feature of HCI, in the situation/example they had given. Candidates seemed content to simply give an explanation of how the menus were used. Some of them also gave mobile phones as a response even though the question had requested responses other than mobile phones.

An example of an appropriate explanation for an information kiosk at a post office is *this machine is intended for use by anyone (the general public) from someone who is semi-literate to a very educated person.*

The most popular responses in Part (b) (ii) were icons, windows and pointers. In addition, radio/option buttons and combo boxes were sometimes given as responses. However obvious objects such as check boxes, list boxes or drop down lists were not included in the responses. Only some candidates were able to provide the advantage of using a particular object. For example, the advantage a radio button possesses so that its inclusion in an interface would make the interface simple and user-friendly.

Candidates lacked knowledge of even the common items/objects found on an interface. Hence, they could not, in their responses, refer to the advantages of using those objects. Examples of the objects include

- Labels
- Text boxes
- Radio buttons
- Combo boxes
- Check boxes
- Drop down lists/ list boxes
- Icons

Generally, the use of technical terms/jargon seemed poor.

Recommendations

1. Students should be asked to compare and contrast different pairs of user interfaces, paying keen attention to the target group, the distinguishing features and functionalities of the various human computer interfaces.

2. Teachers should encourage the compilation of a glossary of technical terms by each student as indicated, explicitly or implicitly, by the syllabus.

Question 6

The question was designed to test candidates' ability to recall facts regarding networking, in particular, the protocols associated with the Internet, the differences between local area networks (LANs) and the Internet, in terms of reach, type of connection and speed of data transmission. They were also required to use their knowledge of star topology, to draw a wireless LAN consisting of a file server, printer, at least three workstations and firewall, based on the given scenario. The mean score on this question was 5.06 out of 20.

In Part (a), most candidates were unable to define the term *protocol*, hence they gave inadequate responses. They also associated the term networking to solely mean the Internet.

In Part (b), the majority of candidates were not able to identify the protocols associated with the Internet. In Part (c), most candidates were not able to explain why protocols are important for communication over the Internet and consequently were not able to pick up any marks for this question.

In Part (d), candidates had difficulty differentiating between LAN and the Internet in terms of the reach, type of connection and speed of transmission. For example, with regard to reach, most candidates associated this term with the number of computers on the network rather than the area spanned by the network. *A LAN is confined to a building, campus or small geographical area whereas the Internet is not confined by distance but is world-wide or global.* Type of connection was interpreted to mean broadband/narrowband/digital subscriber line (DSL)/asymmetric digital subscriber line (ADSL) and not connectivity in terms of type of communication medium: wired, wireless or a mixture of both.

In Part (e), based on their responses, most candidates failed to realize that a wireless LAN can only be configured using a star topology, but without wire or cable, as was stated in the question. As a result, most diagrams included wired connections between the devices (server, printer and computers) and the wireless access point. In addition, only a few diagrams had a firewall, which is important when accessing the Internet.

Recommendations

1. Students should be asked to research and make class presentations on the various networks and HCIs.
2. Students should be encouraged to discuss similarities and differences between the various types of network topologies as well as wired versus wireless networks, which are the trend in networking.
3. Students should be given opportunities to discuss similarities and differences between the various types of HCIs.

Section III - Information and Problem Solving

Question 7

The question was designed to test candidates' knowledge of the problem-solving process, the strengths and weaknesses of data collection tools that are used at the analysis stage of the problem-solving process, and to apply their understanding of the role of particular pieces of information in solving a given problem. Most candidates performed satisfactorily. The mean score was 6.65 out of 15.

In Part (a), most candidates explained the concept of problem-solving without referring to the use of information or information technology tools in the solution process.

In Part (b), most candidates were able to correctly identify an instrument (questionnaire) as a tool used to gather data in the analysis stage of the problem-solving process. For Part (c), most candidates seemed to be unaware of the advantages and disadvantages other than cost and time for each instrument identified. Their responses were limited to single words or short phrases such as 'more expensive' or 'time consuming', with no explanation to support why cost or time would be considered an advantage or disadvantage, suggesting that they were not aware of the reasons these factors could be viewed as either an advantage or disadvantage when using the tool.

Most candidates were able to correctly categorize the pieces of information given in Part (d). However, some candidates did not justify or provided inadequate justification for their responses. For example, to simply state, as justification, that the main bus terminal which is situated one mile from the proposed site 'is critical' was not an adequate response. A more suitable response would be *the distance of the campus from the main terminal is of significant importance to the safety of students who have to rely on public transportation, especially at night. The farther the distance, the greater the risk would be to these students.*

Recommendations

1. Teachers should discuss with students the strengths and weaknesses of the various data-gathering tools in terms of the integrity, reliability and accuracy of the information gathered when the tools are used.
2. Teachers should explain to students the meaning of instructional words such as *discuss*, *describe*, and so on.

Question 8

This question tested candidates' recall of facts concerning different representations of algorithms and required them to analyse given algorithms to determine the result of variables. Most candidates performed below the acceptable level. The mean score was 2.97 out of 15.

In Part (a), many candidates identified at least one way of representing algorithms, specifically, flowcharts. A few candidates gave a second representation, that of pseudocode. Most candidates did not mention narrative or structured English. Some of them confused flowcharts with data flow

diagrams; some identified input-process-output (IPO) charts, Gantt charts and trace tables as algorithmic representations.

In Part (b), most candidates attempted a discussion of the features of each algorithmic representation and provided examples. However, their responses did not address any advantage of the representation when compared with the others. Some candidates suggested that narrative and pseudocode were one and the same as evidenced by the same example for both. Where examples were well done, the candidates were able to provide adequate discussions of the distinguishing features. Poor examples, such as a data flow diagram (DFD) and an entity relationship diagram (ERD), reflected candidates' misunderstanding of the question.

Candidates were required to trace an actual algorithm represented as pseudocode in Part (c). The value of the input was provided and the output (X, Y and Z) were to be derived. This part was poorly done. It would appear that most candidates lacked the general understanding of tracing algorithms and control structures, in particular, looping.

Recommendations

1. Teachers should provide case studies of sample problems and solutions to demonstrate algorithmic representations during class as exercises. The sequencing is important in the delivery of algorithms: Narratives or Structured English → Pseudocode → Flowcharts.
2. Teachers should make class discussions to reinforce the advantages and disadvantages of different techniques.
3. Algorithms can be traced with students so that teachers can help them identify the important components that allow the structure to loop.
4. Teachers should place more emphasis on the operation of the loops as it relates to the component that allows the loop to continue or discontinue (in this case, the increment or counter).

Question 9

The question was designed to test candidates' knowledge and understanding of programming and the program development life cycle (PDLC). It was poorly done. The mean score was 1.89 out of 20.

For Part (a), candidates confused PDLC with SDLC. Candidates failed to realize that once the PDLC had started then the 'problem' had already been defined and analysed. Therefore, the PDLC should focus on the implementation of the solution using a programming language.

For Parts (b) and (c), the responses indicated that candidates seemed to have had limited knowledge or exposure to the concept of control structures and their purpose, and the types of control structures that may be used in programs. However, some candidates were able to name two of the control structures.

For Part (d) (i), the responses by most candidates were generally satisfactory. They were able to provide situations that were suited for procedural programming, for example, finding the total payment for items purchased by customers at a supermarket and calculating the mean scores for the subjects that students did. However, Part (ii) was poorly done as the candidates did not correctly identify the programming paradigm — declarative — suited to map routes using cities and streets. In

this scenario, the program describes *what* is to be accomplished (getting from point A to point B) rather than *how* it is to be accomplished (by car, walking, cycling or running). In addition, there are several routes that may be taken.

Recommendations

1. Candidates are encouraged to use a diagram of the SDLC and clearly show the exploded version of the PDLC, as a subset of the SDLC.
2. Candidates should make clear distinctions between sequencing, looping and selection structures.
3. Candidates should use pseudocode and flowcharts to illustrate the different control structures.

Paper 03/1 – Internal Assessment

This project required students to demonstrate knowledge and understanding of the problem-solving process and display competence in examining potential solutions with the view of determining the most feasible solution.

The projects were generally well done by most students. The mean score was 35.42 out of 60.

The few candidates who scored full marks demonstrated the ability to:

- Identify a problem based on the guidelines provided in the syllabus
- Collect and analyse data that established the major cause of the problem being experienced
- Clearly identify two or more IT solutions
- Completely evaluate the solutions identified
- Select and justify the strategies related to implementing the solution
- Present a project document that was organized, well structured, and contained a cover, content page, abstract and list of references using an acceptable style.

In addition, these students demonstrated mastery of the tools used to process and present their findings (spreadsheets, word processors and databases), draw Gantt charts and prepare their final reports.

None of the projects moderated included the consideration of specialized hardware, computer networks, non-visual interfaces, sensors or Internet technologies such as Voice over Internet Protocol (VoIP) and intranets.

Problem Identification

There was marked improvement in the quality of the problem definitions. The vast majority of the samples submitted documented problems related to information storage and retrieval. Full marks were awarded for a complete and accurate description of the problem identified. Students who gained full marks in this section provided a background that established the context within which the problem occurred. From this background, the moderator was able to determine who the problem affected, the nature of the problem (performance, information, efficiency, control or security), its undesirable effects and who was seeking the solution. However, a few candidates

- were ambiguous in their problem description, which could have led to several interpretations
- identified multiple problems and did not indicate which problem was being solved
- identified very broad problems and did not adequately narrow the scope
- identified problems that did not have an IT solution.

Gantt chart

Students who scored full marks for this component produced Gantt charts which included all stages of the problem-solving process, that is, from Problem Definition to Justification of the Solution. These students utilized special-purpose software (such as Milestones Simplicity) to produce accurate, well-labelled charts. Students who lost marks either omitted activities or did not provide realistic time frames indicated for some activities (tasks) listed.

Analysis of the Problem

Students who scored full marks for this section recognized the role information plays in the problem-solving process as demonstrated by their use of appropriate fact-finding techniques to collect and analyse relevant data. These students:

- applied at least three appropriate fact-finding techniques in the data collection process
- processed quantitative data using a range of features provided by an electronic spreadsheet
- analysed data in summary form to establish the cause(s) of the problem being studied.

Students who lost marks merely used one or more tools to collect data that provided information of very little value to the problem-solving process. Whilst interviews, questionnaires and observations were popular fact-finding techniques, not all of these were utilized appropriately. In some cases, a review of the documents used in the organization would have yielded more useful information.

Identification of Possible Solutions

This component required that students identify at least two information technology solutions. Students who scored highly provided details of how a particular tool or set of tools could be used to solve the problem identified. For example, instead of simply stating Microsoft Access, a student stated that *a relational database management tool such as Microsoft Access [could] be used to create an application that will be used by existing staff, after retraining, to record transactions, perform computations and print on-demand reports.*

The identification of the possible solution should be much more than a statement and should ideally include all or most of the following components:

- Level of automation
- Processing methodology
- Network technology (LAN, Intranet, Internet)
- Software alternatives (custom software using a programming language or application development tool, productivity tool, commercial software or a turnkey system)

- Specialized hardware (non-visual interfaces, sensors, touch-screens)

Students who lost marks for this section:

- did not provide details of the solution but simply stated *implement a computerized system* or *use an automated record management system*
- stated identical solutions such as *implementing a record-keeping system using a database* and *implementing a record-keeping system using a spreadsheet*
- proposed more than one manual solution such as *employing more workers, changing the room in which the files are stored to a bigger size and changing the shelves to steel filing cabinets*. Whereas it is recognized that a non-IT solution is a valid option, providing two or more non-IT solutions is not justifiable, as the focus of the internal assessment is on IT-based solutions.

Evaluation of Possible Solutions

This component required that students objectively evaluate two or more of the solutions identified. A few students scored full marks; they undertook a complete evaluation of the technical, operational and economic aspects of the possible solutions such as:

- Hardware tools
- Software tools
- Network and data communication services
- Costs such as acquisition/implementation and recurrent
- User issues such as recruitment, training needs, user interface
- Other issues such as time required for successful implementation, legal, environmental and technological fit

These students appropriately utilized a spreadsheet to create a decision support worksheet for comparing potential solutions.

Selection of Solution

This component required that students select the most feasible solution based on the objective evaluation previously done. The selection of the most feasible solution should take into consideration the resources required for implementation and those currently available. This component was fairly well done. Students who lost marks did not provide evidence to support their choice of the solution as most feasible.

Justification of Solution

This component required students to thoroughly analyse the issues related to the implementation of the proposed solutions, propose strategies for dealing with the issues, and provide an appropriate justification for all strategies recommended. Very few students gained full marks for this component as they did NOT

- identify issues that may arise as a result of implementing the solution
- recommend strategies for addressing the issues identified
- thoroughly analyse the issues and appropriately justify the strategies recommended.

Presentation and Communication of Information

Under this criterion, full marks were awarded to projects that

- were well organized and structured
- had a cover page, content page and abstract that were all complete
- had a list of sources/references presented using either the APA or MLA guidelines.

Very few students scored full marks as their abstract was either incomplete or did not adhere to the rules stipulated by MLA or APA. In too many cases, the projects had numerous spelling and grammatical errors which suggested that the editing and proofing features of the word processor were not utilized in the document preparation process. Students need to pay attention to the table of contents by assigning correct page numbers to respective pages or using the appropriate feature of the word processor to generate one.

Recommendations

1. Teachers and students should read the guidelines in the syllabus for the internal assessment *before* commencing the project.
2. Students must choose a problem that occurs in their *immediate* environment (home or school).
3. The project work should closely follow the teaching/learning activities related to each component of the project. For example, the Problem Identification should be completed
 - during a scheduled class session
 - after the lesson on *Problem Definition* is taught
 - after *Suggested Activities 1, 6, 7(a), 7(b) and 9* are completed.
4. The project report should adequately document the discussions, analyses and justifications required by the syllabus. The length of the report should be between 1500 and 2000 words excluding diagrams, graphs, tables and bibliographies.
5. Teachers should ensure that the project report contains clearly defined, logically sequenced sections as suggested by the sub-headings in the mark scheme for internal assessment.
6. Students should use appropriate features provided by the word processor to prepare the project report. Some of the features that may be used are:

Editing tools	Tables, footnotes, APA/MLA references, table of contents
Proofing tools	Spell checker, grammar checker, word count

7. Students should ensure that all data collection instruments (observation checklists, questionnaires, interview questions), tables with data/information, charts and graphs are adequately labelled and referenced in the body of the document.

Paper 03/2 – Alternative to Internal Assessment

This paper tested candidates' knowledge and understanding of a 'problem' that they have examined and for which they were required to identify at least two possible solutions based on IT. They were then to determine the most feasible solution. Most candidates performed below the acceptable level. The overall mean score was 15.03 out of 60.

Question 1

Candidates were expected to write a complete, clear description of the problem. However, this should have been done against a background that established the context within which the problem occurred. Most candidates were unable to develop good problem statements; the statements were either very vague or terse, for example, 'new system not working', 'files cannot be found', and so on.

In Part (b), several candidates confused causes of the problem with symptoms/outcomes of the problem. A cause is defined as *that which produces an effect*, whereas an outcome is defined as *a consequence*. In conducting the analysis of the problem, candidates were expected to identify those factors that contributed to the problem. For example, in a paper-based system, one cause would be *files are missing* and the symptom would be *reports are inaccurate or incomplete*.

In Part (c), a number of the candidates were able to identify two other data gathering tools. However, most did not provide any description of the tools. For example, a description for a questionnaire is *a series of questions asked of individuals to obtain useful information about the system*.

For Part (d), candidates were required to compare and contrast one of the tools identified in Part (c) with surveys. Most candidates responded by giving either one-word answers (for example, cost) or short phrases (saves time or time consuming, saves money or less expensive) rather than complete statements, with reasons or explanations to support why these could be considered as advantages or disadvantages.

Question 2

For Part (a), candidates were required to identify and discuss three possible solutions (at least two IT-based and one non-IT based) to the problem mentioned in Question 1(a). The responses of most candidates suggested that they had already identified the optimal solution — an 'automated solution'. Most candidates performed unsatisfactorily.

For Part (b), most candidates cited two concerns that should be addressed simply by writing 'cost', 'security', etc. Concerns included

- the company's goals or projection for the future
- high financial outlay
- employees' or users' reaction to the change

- the company's exposure to computers
- what, if any, existing technology would to be replaced or upgraded
- the disposal of existing technology that would no longer be required

For Part (c), most candidates performed poorly. For the concerns, candidates were expected to present arguments or expand on what was written in Part (b). For example, using high financial outlay, they were to mention the factors that would contribute to making the outlay high – the cost of hardware, software, personnel that would be required if not available from within, training, infrastructural changes, and so on. In addition, the discussion should also include financial options available – leasing, renting and buying – and how the company could manage these arrangements.

Question 3

In Part (a), most candidates did not realize that they were being asked to do a step by step evaluation in terms of the technical, operational and economic aspects of each possible solution.

In Part (b), candidates were expected to include in their discussion an acknowledgement of whether the given statement was factual or not; to provide arguments to support their position; to show that selection of the optimal IT solution was determined by prevailing factors and to say whether or not the impact of cost changes over time.

For Part (c) (i), only a few candidates identified the word processor as the most appropriate software application to generate their report. However, the arguments used to justify their choice were inadequate.

Only a few candidates were able to adequately respond to Part (c) (ii). Candidates were expected to provide particular features or functions of the word processor that would assist them in their solution of the problem.

UNIT 2

Paper 01 – Multiple Choice

The paper comprised 45 multiple choice items, with 15 items based on each module. Candidates performed satisfactorily with a mean score of 26.10.

Paper 02 – Structured Questions

The paper consisted of nine compulsory questions: three questions per module. The mean score was 42.04 out of a possible 150, a decline when compared with 52.37 in 2009.

The comments on Paper 02, Unit 1, are applicable also to this unit.

Section I – Information Management

Question 1

Generally, this question was poorly done. The mean score was 3.13 out of 15.

Part (a) required that candidates explain two uses of computer-based storage solutions such as databases. The responses were satisfactory. Many candidates gave *eliminating/reducing redundancies, storage management, organization, search and retrieval* as appropriate responses, with reasonable explanations. A few candidates misinterpreted the question and gave responses explaining the features of databases such as tables, functions and forms rather than explaining how these features could assist users in making their lives or jobs easier.

Part (b) tested candidates' ability to compare two storage approaches: the database approach and traditional file system approach (flat file) when used in the implementation of a computerized system. This question was poorly done as the majority of the candidates confused the 'traditional file system approach' with a 'manual file system' and therefore their comparisons were between a paper-based system and an automated file system. Both database and traditional file system approaches are applicable to automated systems and the expected responses should have addressed *data independence, control over redundancy, data consistency, better security of data* and so on.

Part (c) tested candidates' knowledge of primary keys. The majority of candidates were able to define what a primary key does but were unable to give its purpose, which is *to allow users to quickly retrieve data/information stored on a database*.

Part (d) tested candidates' ability to use and develop a table structure using standard notation. Only a few candidates were able to give the correct standard notation. Many candidates drew tables and populated them with records. Where standard notation was used, some candidates did not indicate the primary key or repeating attribute.

Recommendations

1. Teachers should ensure that students have a clear understanding of the distinction between *uses, advantages* and *features* of databases.
2. Teachers should have class discussions on the similarities and differences between the database approach and the traditional (flat) file system approach.
3. Teachers should also provide opportunities for students to develop table structures using standard notation.

Question 2

This question tested candidates' knowledge of the changes in file storage techniques, the impact on storage media and the cost arising from these changes. Most candidates performed at an acceptable level. The mean score was 6.06 out of 15.

In Part (a), candidates were required to examine two statements and provide a suitable example that proved each of the statements was valid. Few candidates understood the context of the question and assumed it related to a comparison of a database system and manual filing systems.

Acceptable responses were:

Twenty years ago, storage needs were not as great as they are today. This is true because the files used by many applications at that time consisted mainly of text (words and numbers), while today many applications use multimedia files, which require more space.

OR

This statement is valid because today, data can be processed and stored in a variety of formats other than text such as sound, graphics and so on.

Candidates also failed to correctly assess the second statement. Few candidates made a comparison with the cost per unit of storage in the past as opposed to now.

An acceptable response was

Storage is cheaper today as the cost of production of storage media is drastically lower owing to the raw materials and technologies used. The cost of a unit of storage then can now cover several times that much storage today.

Part (b) was generally well done by candidates. Correct responses included

- Floppies
- CD-ROMs/CD-Rom/CD-RW/DVD
- Email
- Flash Drive/Thumb Drive

In Part (c), candidates were required to assess the impact on an organization when data/information is not received when required. Generally, candidates could explain the concept of ‘untimely’ data; however, they struggled in finding examples relevant to the context of the organization. A good response from a candidate was

If research data is not available in a timely manner, it lessens the production activity of the organization. The decrease in productivity gives competitive advantage to other organizations, thus causing a possible reduction in revenue for the business.

Recommendations

1. Teachers should ensure that students are exposed to the meaning of terms such as *describe*, *discuss*, *outline*.
2. Teachers should utilize varying approaches in delivering lessons, for example, case studies, research projects.
3. Students should be encouraged to do more reading to enhance their knowledge and vocabulary.

Question 3

This question required candidates to use their knowledge of the various modelling techniques that may be used to illustrate the flow of information in a system. Most candidates performed below the acceptable level. The mean score was 6.09 out of 20.

Part (a) required candidates to distinguish between a DFD and an ERD. This question was generally well done by most candidates who gave appropriate differences.

Part (b) (i) tested candidates' ability to give an appropriate definition of the term *cardinality*. This question was poorly done as many candidates did not provide any response. A few candidates were able to define cardinality as *a means of showing relationship between entities*.

Part (b) (ii) tested the candidates' ability to interpret the ERD that was given. The majority of candidates who attempted this question were only able to give the interpretation of the cardinality between pairs of entities in one direction (from left to right), such as *a supervisor monitors many clerks*, but not in the reverse, such as *each clerk is monitored by one supervisor*. Some candidates misinterpreted the question and gave a description of a general organizational activity.

Part (b) (iii) tested candidates' ability to translate a written description of a cardinality and to amend the ERD accordingly. Generally, most candidates gave appropriate responses to this question. A few candidates did not use the correct symbols when drawing the modified ERD.

Part (c) was fairly well done by the majority of candidates as they were able to identify the many ways in which normalization is significant. Some candidates, however, incorrectly stated that normalization removes data redundancy rather than reduces/minimizes data redundancy.

Recommendation

Teachers should provide opportunities for students to interpret, explain, draw and modify ERDs.

Section II – Use of Information Technology Tools

Question 4

The question was designed to test candidates' ability to apply their knowledge and understanding of the features and purposes of popular productivity tools to various situations. It also required candidates to examine factors that should be addressed when obtaining information from various sources. Most candidates performed at an acceptable level. The mean score was 7.06 out of 15.

Candidates seemed not to have understood what was required in Part (a) and often the features of spreadsheets, as opposed to the features of databases, were listed. In other cases, candidates' responses suggested that they could not distinguish or explain the features of a database. Candidates who were able to list the features of databases such as reports, forms, queries and linkage of tables, failed to explain these features.

Candidates performed satisfactorily in Part (b). However, in many instances, they failed to give situations in which the productivity software could be used. Instead, the purpose and features of the software were stated. For example, word processing is used to edit text files, to bold and to send e-mail.

Part (c) proved challenging for candidates and often their responses suggested that they were unaware of the difference between sources of information (books, journals, persons) and information. As a result, information was evaluated and not the sources of information.

Recommendations

1. Students should be encouraged to become familiar with the purpose, uses and distinguishing features of popular productivity tools such as spreadsheet, database, word processor.
2. Teachers should use case studies and ask students to identify and justify their choice of tools for given situations.
3. It is important for teachers to ensure that students have a clear understanding of the distinction between sources of information and information.
4. Students should be asked to compile a list of factors/characteristics to be used when evaluating sources of information and information.
5. Teachers should encourage students to use the correct terms, for example, students should refer to using the word processor to 'type', 'generate' or 'create' a letter rather than stating that the word processor is used to 'write' a letter.

Question 5

The question examined candidates' knowledge and understanding of the hypertext mark-up language used in the development of web pages. Most candidates performed below the acceptable level. The mean score was 4.83 out of 15.

In Part (a), candidates' responses demonstrated a lack of attention to detail, specifically in the HTML syntax. Hence, although candidates provided HTML tags, the placement or use of the tags was inaccurate.

The use of the attributes for certain tags was also inaccurate. This was demonstrated in formatting the heading and paragraph. Candidates should be made aware that attributes are normally included within tags in the form of *attribute = property*. For example, `face=Vivaldi, size=30, weight=bold`.

Improper sequencing and nesting of tags was also evident in formatting the table. Table tags should generally appear in the following form:

```
<table><tr><td>Service</td><td>Price</td>...</tr></table>
```

Generally, in Part (b), most candidates provided the correct responses of FTP and HTTP. However, only one candidate gave the correct response of SMTP, as the protocol for sending electronic mail. Some candidates confused HTML with HTTP as a protocol for transferring web pages.

Recommendation

Teachers should ensure that students are familiar with frequently used HTML tags such as title, headings, paragraph, tables and so on.

Question 6

The question examined candidates' knowledge and understanding of concepts related to the Internet (web-based services) and emerging technologies. Most candidates performed unsatisfactorily. The mean score was 3.50 out of 20.

In Part (a), most candidates were able to identify a web-based service that was appropriate for the project and could justify the recommendation. However, the responses regarding concerns that users ought to be aware of when using the particular web-based service were either vague or poor.

In Part (b), the majority of candidates responded with temperature control as well as that of making ice. They did not realize that intelligent equipment would possess a computer chip which is programmable. Therefore, an intelligent refrigerator would keep track of the items in it and could produce a grocery list for the householder when the stock is depleted or, based on the householder's eating habits, it could alert him/her of potential health risks.

In Part (c) (i), candidates were using the term 'communication' very loosely to explain the concept 'Internet Telephony'. Some did not associate this with using telephone technology to verbally communicate with each other using VOIP.

In Part (c) (ii), candidates were able to adequately give an advantage/disadvantage of this technology.

For Part (d), candidates were not able to gain full marks because they spoke in general about Informational Website and not the characteristics such as being factual, authored or referred. In terms of the Advocacy Website, some candidates were not familiar with the term; hence, they were not able to respond adequately.

Recommendations

1. Students should be asked to research and make presentations on the different types of websites (see syllabus for listing), paying particular attention to similarities and differences between various types.
2. Teachers should encourage students to research emerging information technologies and ensure that they understand why these technologies can be categorized as emerging, information and/or intelligent.

Section III – Social, Organisation and Personal Issues

Question 7

This question was designed to examine candidates' knowledge and understanding of the ways in which IT impacts on society with particular consideration given to the areas of commercial transactions, the legal system, education and health. It also sought to test candidates' ability to develop appropriate mitigation strategies to minimize health risks. Most candidates performed below the acceptable level. The mean score was 4.71 out of 15.

In Part (a), a number of candidates had some degree of difficulty providing meaningful discussions regarding the impact on society in the given areas. The impact could be either negative or positive.

In Part (b), the responses of the majority of candidates indicated that they did not know about spoofing and phishing. However, most candidates gave the correct response for hacking.

In Part (c), most candidates were able to state the health problems associated with the use of computers. However, many could not describe the cause of the health problem or the correct mitigation strategies. In addition, a few candidates did not use the correct names for the health problem or mitigation strategy. For example, they referred to 'wrist pain' instead of 'carpal tunnel syndrome', 'anti-monitor screen' instead of 'anti-glare screen'.

Recommendations

1. Students should be encouraged to use examples, where applicable to support the discussions or explanations.
2. Teachers should provide students with exercises on topics related to the impact of IT on society and threats and vulnerabilities.

Question 8

This question examined candidates' knowledge and understanding of mitigation strategies such as disaster recovery plans, stand-by generators and licensing agreements. The question was poorly done by most candidates. The mean score was 2.91 out of 15.

For Part (a), many candidates failed to highlight the fact that a disaster recovery plan (DRP) should have a step by step approach or complete detailed instructions that can be used for emergency processing by a company or individual in the event of a disaster. Instead candidates restated the words 'plan' and 'recovery' in the definition without considering the background of the problem that was given. Most candidates were able to state that a DRP assists with the recovery process after a disaster.

For Part (b) (i), most candidates were able to mention that a stand-by generator provided electricity in the event of a power failure in the public supply. However, only a few stated the reason for the continuous power — that *the organisation can continue its business operation*.

For Part (b) (ii), the majority of candidates simply stated what the additional steps were — for example, backing up the system/files and placing computers and related equipment several feet above the floor — but failed to show how these steps would assist the company to resume operation should a disaster occur.

For Part (c) (i), most candidates were not aware that all the software were copyrighted but with certain privileges. Many candidates were unaware that open source software is not free, but that the source code of the software can be modified by the user. Most candidates wrote that ‘open source software is available to all at no cost’. Many candidates incorrectly thought shareware meant that the software is shared and did not know that the software is free only for a trial period. Many candidates were unaware that freeware software should not be sold.

Recommendation

Teachers need to give students more experience with practice questions and/or case studies on this part of the syllabus.

Question 9

This question focused on end user license agreements (EULAs) and distinguishing among copyright, patent and trademark laws. Candidates were also asked to examine the implications and consequences of software piracy and to evaluate and distinguish between the different types of malware, with particular focus on evaluating Internet policies and security measures that mitigate these concerns. Overall, this question was unsatisfactorily done for a topic which has well-established literature. The mean score was 5.14 out of 20.

The definition in Part (a) (i) was misrepresented and poorly done overall. Many candidates did not identify that the EULA was a part of the software, based on the generality of the responses.

Part (a) (ii) required candidates to discuss three pieces of information that can be found in the EULA. Most candidates were able to list some of the features found in the EULA. However, they could not provide reasoned arguments and examples to substantiate the features required. Overall, the responses were vague.

In Part (a) (iii), candidates were expected to discuss, using examples, the risk to the school of accepting the license agreement without reading it. Candidates were able to provide a generality of real-world examples that supported the answer required. However, they were unable to provide a clear outline of what the specific risk was, neither were they able to relate their responses to the specific context required.

In Part (b) (i), candidates were required to discuss two challenges that have arisen from the use of these types of software. This question was well attempted in that candidates were able to identify challenges. However, their ability to deliberate and provide reasoned arguments to support statements was limited.

Part (b) (ii), where candidates were expected to provide a possible solution to at least one of the challenges identified, was the best answered part of the question. Candidates provided well reasoned solutions to support their arguments.

Recommendations

1. Students could look at different EULAs and provide a summary report on their features as an ongoing class exercise.
2. Students could use concept maps and concept frames to organize and illustrate the inter-relationships between various pieces of information provided by the EULA.
3. Students should be encouraged to discuss and debate the social implications and risks of using a software license agreement as a means of knowledge reinforcement.
4. Teachers should invite guest speakers who deal with these legal concepts to participate in class activities on a regular basis. In addition, students should be allowed to copyright original work done and initiate discussions on the importance of copyrighting their work and ideas.
5. Concerning malware, teachers should use scenarios and case studies to help students identify which types of malware have been activated and justify the answers given. From this, valid solutions or avoidance strategies can be recommended.

Paper 03/1 – Internal Assessment

This project enabled candidates to demonstrate their skills and competence in using IT tools to assist them in developing a solution to a problem.

The projects were generally well done by most candidates. The mean score was 41.35 out of 60, a significant improvement when compared with 2009.

Problem Identification

Full marks were awarded for a complete and accurate description of the problem identified. Candidates who scored well provided a background that established the context within which the problem occurred. From this background, the moderator was able to determine who the problem affected, the nature of the problem, its undesirable effects and who was seeking the solution. However, most candidates merely wrote a single sentence for the problem, providing no background in which the problem occurred. In addition, a few candidates were ambiguous in their problem description thereby opening up the possibility for several interpretations. A limited range of problems were identified and related to the management of records in educational, medical and retail establishments.

Analysis of the Problem

Most candidates did not describe their findings from the various data-gathering activities done. In the analysis phase, candidates were expected to conduct a study of the problem, using two or more tools (questionnaires, interviews, observation and review of documentation) to determine what the facts/issues were concerning the problem. This would assist them in identifying the actual causes of the problem, rather than relying on the perception of others. This phase also affords candidates the opportunity to refine the problem statement.

A few candidates included a justification of the data-gathering tools used. However, this was not required.

Identification and Justification of IT Tools

Candidates were required to use productivity and/or web tools to implement their solutions. Although most candidates were able to identify productivity tools that could be used to assist them to solve the problem, many were unable to adequately justify the use of these IT tools. A few candidates identified tools that were not in keeping with the requirements of the syllabus such as global positioning systems (GPS), networking and voice recognition systems. Whilst hardware devices such as bar code readers and point of sale systems are IT tools, the syllabus is very specific about the subset of IT tools that are acceptable for use in creating the solution.

Assessment of the Implications of the Solution

This section proved challenging to most candidates. A number of candidates provided statements on the issues rather than a discussion of the issues. Only a few candidates mentioned strategies that could be employed to address the issues raised.

One candidate who gained full marks for this section stated:

An increasing number of businesses report that their customer databases have been accessed without authorization. Thus, to prevent this issue of security (breach), a strategy has been implemented to prevent unauthorized access to the database. To prevent information from being tampered with, passwords can be implemented. A strong password containing symbols, numbers and letters and no less than seven characters should be created. There should also be different levels of security access to the system as junior staff should not have the same privilege as senior staff.

Implementation of the Solution

Appropriate Use of IT tools and their features

Most candidates' use of the IT tools in implementing their solutions was appropriate. For example, the word processor was used to generate form letters and the spreadsheet application to perform computations. However, most candidates did not exploit the most appropriate features of the tool in implementing their solutions, especially when using the database management system. No security features were evident, the 'form' feature was not used for data entry and queries were not used to build reports.

Human Computer Interface

For the database or web page component, the solutions revealed limited use of navigational features and labelling. Some solutions did not employ navigational features or buttons, for example, tab keys, arrow keys, BACK, NEXT, PRINT, CLOSE.

Working Solution

Although the majority of solutions were satisfactory, some of the solutions did not meet the minimum criteria as stipulated in the syllabus.

Recommendations to teachers

1. Students should be encouraged to identify a problem that exists in their environment (school or community) and for which an IT-based solution is feasible.
2. Students should be encouraged to use features such as forms, reports and queries when building databases.
3. To assist in the construction of web pages, students should refer to the recommended text, *Computer Concepts*, or any other suitable source for guidance.

Paper 03/2 – Alternative to Internal Assessment

This paper tested candidates' ability to apply appropriate features of software tools in developing solutions to a problem encountered in their environment (school or community). Most candidates performed below the acceptable level.

Question 1

Candidates were expected to write a complete, clear description of the problem. However, this should have been done against a background that established the context within which the problem occurred. Most candidates were unable to develop good problem statements.

One candidate detailed an algorithm as the problem statement, not realizing that an algorithm is a problem solution.

In Parts (b) and (c), most candidates were aware of the tools that could be used in carrying out their analysis of the problem. However, with regard to providing arguments to justify their choices or to support the advantage/disadvantage of the tools, their responses were poor.

In Part (d), several candidates confused causes of the problem with symptoms/outcomes of the problem. A cause is defined as *that which produces an effect*, whereas an outcome is defined as *a consequence*.

In Part (e), a few candidates were able to provide the steps in the problem-solving process, once the analysis stage was done.

Question 2

Candidates performed below the acceptable level on all parts of this question. In Parts (b) and (c), a few were able state the likely impact that a solution would have on the organization and two tools to be used in the implementation of the solution. However, candidates were not able to give adequate arguments to support why these were factors to be considered in Part (b) or their choice of features in Part (c). Candidates' responses to Part (d) seemed to indicate that they were unfamiliar with the human computer interface concept.

Question 3

All sections of this question were poorly answered. The responses given by candidates suggested that they were not aware of the various database concepts and terminologies.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
ADVANCED PROFICIENCY EXAMINATION**

MAY/JUNE 2011

INFORMATION TECHNOLOGY

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GENERAL COMMENTS

The number of candidates writing the Unit 1 examination declined from 1,124 in 2010 to 1,121 in 2011. However, for Unit 2, the number of candidates writing the examination increased from 452 in 2010 to 523 in 2011.

Overall, there was an improvement in candidates' performance across both units. Approximately 89 per cent of candidates achieved acceptable grades as compared with 73 per cent in 2010. In Unit 1, candidates' performance improved on Paper 01 (Multiple Choice), Paper 02 (Extended Response) and Paper 032 (Alternative to the School-Based Assessment). Performance on Paper 031 was marginally lower than in 2010. It must be noted that candidates continue to struggle with Problem Solving in a systematic manner as evidenced by poorly designed flow charts.

In Unit 2, 96 per cent of candidates achieved Grades I–V compared with 94 per cent in 2010. While there was a decline in performance on Paper 01 and Paper 031, there was marked improvement on Paper 02 and Paper 032 when compared with 2010.

It was noted that several candidates provided responses that were 'outside' the domain of Information Technology. Terminologies and concepts have specific meaning within the realm of Information Technology, and therefore 'everyday', mainstream definitions of these terms and concepts would result in candidates providing inappropriate responses. Teachers are advised to supply students with a glossary of IT terminologies and concepts which would aid students in this regard.

In addition, the responses of a number of candidates to items which assessed the higher order skills (Application and Analysis, and Synthesis and Evaluation), continue to be of concern to the examining committee. Responses were generally not at a level desirous or indicative of an advanced proficiency. For example, on one item, candidates were asked to state how natural disasters could pose a threat to the IT system within an organization. Many candidates simply wrote 'hurricane' rather than a more acceptable response such as *the winds and the rains from a hurricane could cause destruction and/or flooding to buildings and computer systems.*

Candidates should also be encouraged to pay particular attention to the marks allocated to questions and be guided so as to respond accordingly. Also, the importance of reading the questions carefully before attempting to respond cannot be overstated.

To address concerns regarding the quality of responses to questions which use such verbs as *explain, justify, evaluate, examine and distinguish*, teachers are encouraged to include more questions of this type on internal examination papers and homework assignments. It should be noted that a glossary of these terms can be found in the syllabus.

DETAILED COMMENTS

UNIT 1

Paper 01 – Multiple Choice

The paper comprised 45 items, 15 items per module. Most candidates performed satisfactorily. Marks on this paper ranged from a minimum of 13 to a maximum of 41. The mean mark for the paper was 62.76 per cent.

Candidates experienced difficulties with items based on Unit 1, Module 1 (Fundamentals of Information Technology) and Unit 2, Module 3 (Use of Information Technology Tools).

Paper 02 – Structured Questions

The paper consisted of nine compulsory questions, three questions per module. The maximum score was 121 out of 150. The mean score was 52.55, compared with 33.91 in 2010.

In Unit 1, whereas candidates performed comparably on Sections I – Fundamentals of Information Technology and II – Information Technology Systems, their performance was weakest on Section III – Information and Problem Solving.

Section I – Fundamentals of Information Technology

Question 1

For this question, candidates were expected to clearly demonstrate their understanding of the distinctions among three concepts (data, information and knowledge), and to provide an example of each of these concepts. In addition, candidates were required to, with respect to a computerized student registration system, identify and discuss one way of representing data and one way of representing information within the particular system. Most candidates performed satisfactorily. A few candidates scored full or very high marks on this question.

In Part (a), although some candidates understood the distinctions among the three concepts, a considerable number of them could not articulate a sound grasp of these fundamental/elementary concepts. Of particular concern were the examples that candidates cited, many of which were not within the context of Information Technology.

In Part (b), candidates were to explain the characteristic of data — qualitative and quantitative. This part of the question was generally better done than the other parts. Some candidates got confused or contradicted themselves by carelessly stringing together some of the relevant terms. For example, some candidates wrote that qualitative data was ‘opinion-based and objective’ rather than *subjective* as would be expected.

A significant number of candidates avoided Part (c) of the question and for those who attempted, it was poorly done. Whereas the identification of an example each of data and information seemed to elude many candidates, the vast majority did not correctly identify appropriate representations.

Recommendations to Teachers

- There is a need to clearly distinguish between concepts such as data and information, information and knowledge, and qualitative and quantitative data, and to offer students multiple valid examples.
- Students need to be given adequate opportunities to analyse scenarios and real-world problems, to identify and apply the relevant information technology concepts. Coupled with these opportunities, there is the need to stress the importance of effective communication of ideas, examples and illustrations within the context of Information Technology.

Question 2

This question was designed to assess candidates' knowledge and understanding of the sources of information. Most candidates performed at an acceptable level. A few candidates scored very high marks (over 80 per cent of the marks allocated).

Part (a) required candidates to discuss various types of information sources. Correct responses from candidates included the tools used in the gathering of information such as *questionnaires*, *observations* and *interviews*. Some candidates incorrectly cited the Internet as a source. The Internet is a global network. Examples of information sources that may be accessed via the Internet include *websites*, *wikis*, *blogs*, *discussion groups*, *online libraries*, *e-books*, etc. Some candidates could identify at least one information source.

In Part (b), candidates were expected to state the information to be retrieved from the particular information source and to identify a computer-based tool that could be used to assist in its retrieval. Responses from some candidates were poorly done, as they could not state the information which they could get from each information source and consequently they could not identify a computer-based tool that could be used to assist in the retrieval of the information.

Part (c) required candidates to explain three characteristics of information sources. The majority of candidates stated at least one of the characteristics but it was noted that most candidates who got the question incorrect were actually making references to characteristics of information.

Recommendations to Teachers

- It is important to differentiate between the Internet (global network of networks) and the services it offers such as WWW, websites, blogs, wikis, IRC, newsgroups, etc., noting that the Internet is not an information source but the 'vehicle' to get to various information sources.
- Students should be allowed to explore situations where information technology based tools can be used to retrieve information from various information sources.
- It should be made clear that the characteristics of 'Information Sources' and 'Information' may differ. These differences must be adequately explained with relevant information technology examples.

Question 3

This question tested candidates' understanding of three telecommunication terms (transmission medium, modulation and bandwidth) and the role of the Internet in the education, health and human resource management sectors. In addition, candidates were required to illustrate their understanding of the concept of automated information processing, with the aid of a labelled diagram. Most candidates performed satisfactorily on this question, with a few scoring very high marks (at least 16 out of 20 marks).

With respect to the three explanations, candidates generally lacked specificity in defining the Internet. Features of the Internet were being given as responses. The term 'Internet' was being confused with the 'World Wide Web'. The concept of a *worldwide* or *global* network was missing and hence reference was hardly made. Generally, it was felt that candidates had not understood the concept of the Internet. Most candidates only scored half the marks for this part of the question.

The following observations regarding explanations of concepts were noted.

Transmission medium: There was a general lack of specificity in explaining this term and most candidates failed to identify transmission medium as a material or substance. The words 'transmission' and 'medium' were repeated in candidates' explanations.

Modulation: Again, there was a lack of specificity in candidates' explanations; most candidates who identified the term as signal conversion erred in their responses by writing 'conversion of digital to analogue signals and vice versa'. It should be noted that the conversion from analogue to digital signals is called de-modulation.

Bandwidth: Candidates were able to identify the term as the rate of data transmission. Words such as 'amount of' and 'capacity' were also used. However, few candidates made reference to or tied their response to a 'communication channel'.

In Part (a) (iii), candidates were required to discuss the impact of the Internet on education, health and human resource management. Below is a summary of candidates' responses given in each of the three areas.

Education: Responses in this area were generally good although a few candidates made use of technical jargon such as blogs, wikis, etc. in their responses. Research was the most popular use identified and to a large extent e-learning.

Health: Generally good responses were encountered.

Human Resource Management: Candidates interpreted this term simply as 'Human Resource'. As a result, references were made to the loss of jobs traditionally performed by humans, due to advances in telecommunication technology. Overall, responses were generally poor.

Part (b) required candidates to explain the concept of 'automated information processing', with the aid of a labelled diagram. While the majority of candidates provided an appropriate diagram, the processes of converting 'data into information' and 'using IT systems or computers' were lost in their written explanations.

Overall, candidates lost marks as a result of their lack of specificity and inadequate explanations of technical jargon. Although general understanding was implied, it was felt that candidates needed to provide responses that were more specific and more appropriate for the CAPE level.

Recommendations to Teachers

- Compiling a glossary of terms referenced in the syllabus may prove useful.
- Students should be encouraged to relate the subject matter to the real world via examples, recent developments and application in the field. Research papers may help in this regard.
- Students should be urged to refrain from writing in layman terms and to become more familiar with technical IT jargon.

Section II – Information Technology Systems

Question 4

This question assessed candidates' knowledge and understanding of the major components of an information technology system using the automated teller machine (ATM) system as an example. The question was generally not done at an acceptable level by most candidates. Very few candidates scored very high marks. The mean mark was 5.29 out of 15.

For Part (a), candidates were required to list three major components of an information technology system. Most candidates were able to get at least one of the three marks awarded in this section of the question. Some candidates lost marks because they confused the components of an information technology system (hardware, software, people/user, and communication/network) with the components of a computer (input, output, storage and software).

Part (b) required candidates to identify the input, output and storage devices of an ATM system and to describe the specific activity/task to be performed by the particular device. In general, candidates failed to identify the particular device involved such as the card reader, touch screen or keypad as input, monitor or printer as output and hard drive as a storage medium. As such, they were unable to describe the specific task to be done. A few candidates failed to give a response directly related to the ATM system and wrote in general terms, for example, 'the input device to enter data' rather than *a keypad is the input device used to enter customer data such as pin and the amount to withdraw/deposit.*

In Part (c), candidates were required to explain the concepts of 'Management Information Systems' and 'Expert Systems', using suitable examples. In their explanations of the types of application software, candidates were expected to describe the distinguishing features and to give an example of the particular type of application software. For example, the management information system (MIS) provides information, needed by managers, to make decisions or to assist them in solving problems encountered in an organization. An example of an MIS is Human Resource Management System.

Recommendations to Teachers

Teachers are encouraged to utilize varying teaching strategies to ensure that students get a better grasp of the material covered in this objective.

- Students should be encouraged to thoroughly read the paper to ensure they fully understand what the question requires.
- Teachers are advised to identify the various devices that comprise ‘everyday’ IT systems such as POS and ATMs and to discuss specifically what each device allows the user to do.
- Research papers and projects on information systems should be facilitated.

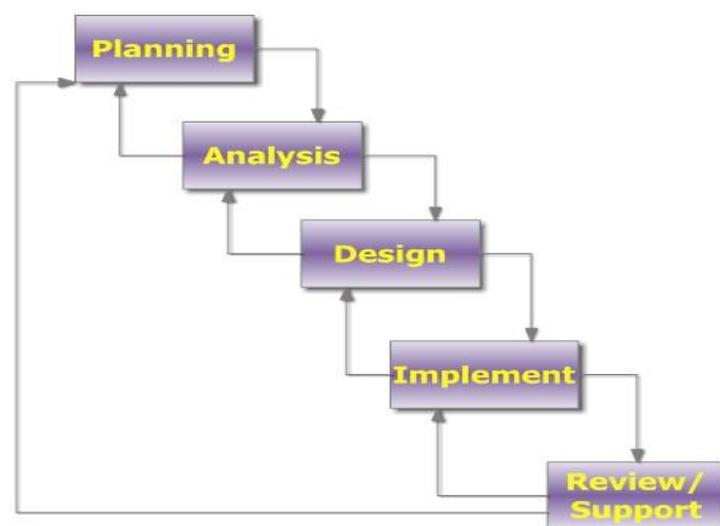
Question 5

This question was designed to examine candidates’ knowledge and understanding of the System Development Life Cycle (SDLC) and the tools that may be used at particular stages. Candidates performed well on this question, scoring a mean of 8.15 out of 15.

In Part (a), candidates were expected to illustrate the stages of the SDLC in a diagram. Most candidates were able to gain more than half of the seven marks which were allotted to the question and produced diagrams that showed a detailed life cycle. However, a few candidates lost marks because of the following:

- Attaching phrases to the names of the stages which completely changed the correct meaning, for example, ‘analysis of data’.
- Giving responses using abbreviations they had used as study aids, for example, FS and SA.
- Merely listing the stages in bulleted form or in a table.
- Not giving the correct sequence of the stages.

An example of an appropriate candidate response is shown below.



In Part (b), candidates were required to state the stage of the SDLC where three particular tools, namely the Gantt chart, entity-relationship diagram and the interview, would be appropriately used and the purpose of the tool at that stage.

Gantt chart: Most candidates were able to state the stage and clearly explained the function of the Gantt chart as it relates to the scheduling of activities to be done.

Entity-Relationship Diagram (ERD): Most candidates were able to state the stage at which this tool is used but were not able to explain what the ERD is and its function at that particular stage.

Interview: Responses were poor. Candidates were able to state the stage but gave a general statement explaining an interview rather than making the explanation specific to the problem.

Candidates who scored well included some of the following points in their responses.

Gantt Chart – can be appropriately used at the planning stage. Its function at this stage is to give a time schedule of when the various tasks involved in developing the new system should start and be completed.

Entity-Relationship Diagram – can be appropriately used at the design stage. Its function at this stage is to illustrate the various entities in the proposed system and their relationships to each other.

Interview - can be appropriately used at the analysis stage. Its function at this stage is to gather data from users about the present system, the problems they are currently facing, and what features they are looking for in the new system that would solve some of these problems.

Part (c) presented a challenge for candidates. Most of them were only able to earn one of the two marks awarded. The question asked candidates to explain why training is an important part of the system development process. This question was making reference to the end-user not being familiar with the new system and hence not effectively and efficiently using the system, thus the need for training. However, candidates misinterpreted the question and gave responses which related to the training of the developers of the system. An example of a good response was

Training is an important aspect of the software development process as it enables the end-users of the newly developed system to become familiar with the features of the system so that it can be properly, effectively and efficiently utilized and hence allows the business/institution to be more productive.

Recommendations to Teachers

- Students should be encouraged to read all questions thoroughly, paying special attention to key words and phrases in an effort to understand the requirements of the question.
- Students should be asked to do research on the various stages of the SDLC, paying particular attention to what is done, what tools are used at each stage, and what the major outputs (deliverables) are from each stage.
- Teachers should make every effort to ensure that all aspects of the syllabus are clearly understood by most, if not all, students taking the examination.

Question 6

This question was designed to assess candidates' knowledge and understanding of the types of computer networks and transmission media that can be used for connectivity. Overall, the performance of candidates on this question was unsatisfactory. The mean was 6.26 out of 20.

For Part (a), candidates were expected to explain the two differences between a local area network (LAN) and a wide area network (WAN) in terms of the geographical area spanned, speed or configuration (type of devices/equipment used to build the network). Most candidates were able to give the difference between the two types of networks in relation to the geographical area covered by each. Only a few candidates gave an acceptable second differentiating characteristic.

For Part (b), candidates appeared to be unfamiliar with the concept of transmission media (the material/substances capable of carrying signals in a communication channel) and therefore, most candidates gave incorrect responses. A few candidates gave examples from the list of expected responses:

Wired: Twisted Pair (TP); UTP; STP; Coaxial; Fibre Optic
Wireless: Infrared; Microwave, Radio wave

As a result of their responses in Part (b), some candidates were not able to explain fully, as required in Part (c), how wireless media could be effectively used in a school environment. A number of candidates did not understand the word 'application' to mean 'use'.

Part (d) required candidates to distinguish between two pairs of concepts: (i) Intranet and Extranet and (ii) MAN and VPN. Most candidates knew that the Intranet was primarily for internal use by an organization and the Extranet for external use, but they failed to state the use by whom — employees versus customers and suppliers. An appropriate response from a candidate was

An intranet is a variation of the Internet that only grants access to employees of an organization, while an extranet is a type of intranet which allows suppliers and customers to access the organization's network.

Most candidates were able to state what a MAN is, but many did not know that MAN is a public high speed network and that the VPN was for mobile/remote users over a secure connection to a company's network.

Recommendations to Teachers

- It is important to discuss similarities and differences between the various types of network topologies in terms of geographical area spanned (reach), transmission speed, configuration/topologies, and cost to build.
- Communication media and devices (cables, hubs, switches, routers, gateways, etc) that are used in building the various types of networks should be identified and discussed.

Section III – Information and Problem Solving

Question 7

This question assessed candidates' knowledge of the problem-solving process, information sources and the role of information in problem solving. Part (a) required candidates to state five stages of the problem-solving process; Part (b) required them to discuss two pieces of information that would be relevant to an IT manager who has decided to use the problem-solving process to create an automated solution for the HR department. Part (c) required candidates to discuss two criteria that the IT manager should consider in deciding if and how a piece of information should be used. The mean mark for this question was 5.68 out of 15.

For Part (a), most candidates' responses were quite adequate. However, a few went on to subdivide each stage, which was not required. Some candidates listed the stages using a single word such as 'define' and 'analyse' rather than 'define the problem or problem definition' and 'analyse the problem or problem analysis', respectively.

For Part (b), most candidates were able to identify two pieces of information but many failed to identify appropriate information sources and the purpose of the piece of information in solving the problem. For example, some candidates indicated that the IT manager should get the list of duties performed by persons in the HR department, but stated that this information would come from websites, books and other employees in the company rather than from the persons who work within the HR department. One candidate who scored full marks on this part of the question correctly stated that the IT manager would be interested in the duties done by the HR department to help guide the design of the new system.

For Part (c), most candidates' responses were based on the characteristics of information and therefore they were unable to state criteria that the IT manager could use to determine whether to accept or reject the piece of information. Where candidates provided appropriate responses for the criteria, many failed to give a reason for its use in accepting/rejecting the information.

Recommendations to Teachers

- Students should be allowed to identify pieces of information and information sources that would be required to solve problems, given specific scenarios.
- Using pieces of information based on given scenarios, students should be asked to state whether they would use, accept or reject the pieces of information and why.

Question 8

This question assessed candidates' ability to develop a context level data flow diagram (DFD) based on a list of tasks to be done. The mean mark was 5.68 out of 15.

In Part (a), many candidates had great difficulty providing a clear and accurate explanation for the use of DFDs. Most candidates scored one out of the three marks allocated by merely stating that it 'shows the flow of data'. Candidates were expected to add that *it is used to assist developers and other stakeholders (management and users) to visualize the behaviour of the system during the design phase of the SDLC.*

Part (b) was well done as most candidates accurately identified the given DFD symbols.

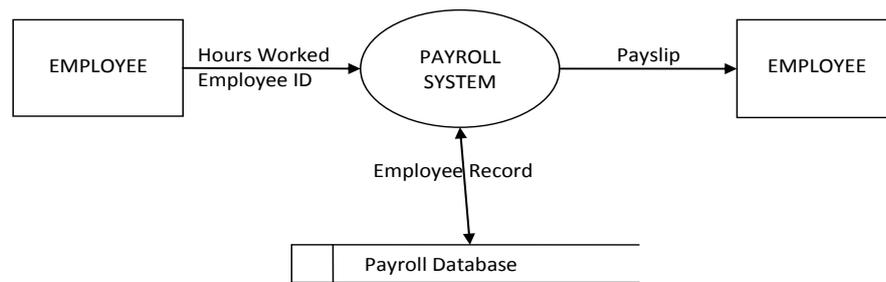
In Part (c), candidates were required to draw a context diagram for the payroll system described in the question. Many candidates included flow chart symbols in their responses, despite being provided with the symbols in Part (b) of the question. Candidates were required to adhere to the rules applicable in developing a context level diagram: only one process, with identifier 0 (zero), appropriate names for each entity (source/sink) and major dataflow, and at least one dataflow into and one dataflow from the system. In some recommended texts, major (primary) data stores are also included on the context level DFD.

Recommendations to Teachers

- Ensure that students are able to differentiate between context level and level-1 DFDs
- Emphasis should be placed on the use of the correct DFD symbols
- Ensure that students understand the purpose of each symbol and are able to differentiate between DFD and flowchart symbols
- Explain and illustrate how to move from a description of a system to data flow diagrams (context level and level-1). Note: the level-1 diagrams should include no more than five processes
- Ensure that students are aware of the rules in developing DFDs and the proper naming conventions for entities, data stores, data flows and processes
- Encourage students to use a table, similar to the one below, to assist them in identifying the entities, data flows, data stores and processes within the system. This would guide them in drawing accurate DFDs. For example, based on the system described in Part (c), the completed table for the context level DFD is shown below.

Process	Name of entity or data store	Source or Destination?	Data Flow
Payroll System	Employee	Source	Hours worked, Employee ID
Payroll System	Employee	Destination	Payslip
Payroll System	Payroll Database	Source	Employee Record
Payroll System	Payroll Database	Destination	(Updated) Employee Record

Therefore, an example of the resulting DFD is



Note: The data store on the Context Level DFD is optional

- Finally, use a variety of exercises to ensure that students become familiar with constructing DFDs. This will enhance their logical and critical thinking skills.

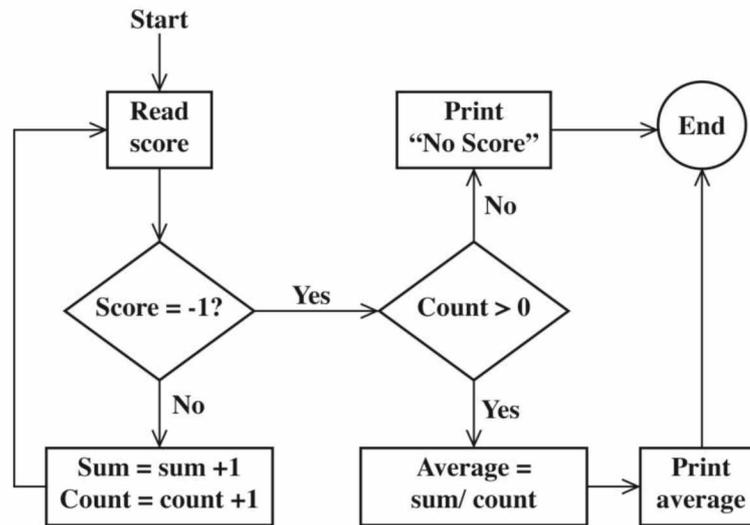
Question 9

This question was designed to test candidates' knowledge and understanding of the role of algorithms (flow charts) and programming paradigms/languages in solving real-life problems. This question proved to be the most challenging to candidates and therefore performance was extremely weak. The mean mark was 2.94 out of 20.

In Part (a), very few candidates could identify three programming paradigms and give an example of each. Some candidates confused programming paradigms with control constructs (sequence, selection and looping) and the ways of representing algorithms (flow chart, narrative and pseudocode). Other candidates wrote the names of three programming languages but either associated the language with the wrong paradigm or did not provide the programming paradigm — an indication that they may be unfamiliar with the concept of programming paradigm (refer to Unit 1, Module 3, Specific Objective 11).

For Part (b), candidates were able to adequately explain the benefits of developing an algorithm before writing program code. A good response from one candidate was *An algorithm allows the programmer to plan out what is to be done and in what sequence, in order to minimize programming errors.* Some candidates defined an algorithm instead of providing the benefit of developing an algorithm. There were cases where a few candidates considered an algorithm and pseudocode as two different things or an algorithm to be a part of a program.

For Part (c), although some candidates were able to use the appropriate symbols in their flow charts, many failed to produce an accurate flow chart based on the given scenario. Many candidates misinterpreted the question and drew a flow chart that accepted a pre-defined set of values as input. Based on their responses, candidates had challenges with the selection and looping segments of their flow chart. A few candidates responded with pseudocode and data flow diagrams. A suggested response is shown below.



In Part (d), many candidates were able to correctly identify the type of error. They were able to adequately explain that it was a semantic error, which resulted from faulty programming logic as the program was able to compile and execute, whereas a syntactic error would have resulted from faulty program code during compilation. However, most candidates could not give any reasoned argument for the possible cause of the error (the conditionality of the score was not done within the loop) and how it could be resolved. The failure of candidates to provide accurate flow charts may have contributed to their inability to identify the cause of the error and possible resolution.

Recommendations to Teachers

- Ask students to research the various programming paradigms and languages. Ensure that they become aware that some languages span two or more programming paradigms, for example, C++, Prolog, and Python. Also, with the rapid pace of technological developments, new paradigms emerge and therefore students need to become aware of the changes.
- Describe scenarios, extracted from students' environment, and have them use the various algorithmic forms (flow charts, narratives and pseudocode) to develop solutions. Ensure that these scenarios will require them to utilize the various control constructs. Where possible, students should be allowed to develop program code (using Basic or Pascal) from algorithms so that they can appreciate the benefits of algorithms.
- Provide examples of algorithms with faulty logic and have students identify and correct the errors in them. Students should be asked to give valid arguments for the errors identified.

Paper 031 – Internal Assessment

This project required students to demonstrate knowledge and understanding of the problem-solving process and to display competence in examining potential solutions with a view to determining the most feasible solution.

This year, the mean score declined from 35.42 in 2010 to 32.73 out of 60.

Students who scored full marks demonstrated the ability to:

- identify a problem based on the guidelines provided in the syllabus
- collect and analyse data that established the major cause of the problem being experienced
- clearly identify two or more IT solutions
- completely evaluate the solutions identified
- select and justify the strategies related to implementing the solution
- present a project document that was organized, well structured, and contained a cover, content page, abstract and list of references using an acceptable style.

In addition, these students demonstrated mastery of the tools used to process and present their findings (spreadsheets, word processors and databases), draw Gantt charts and prepare their final reports.

None of the projects moderated included the consideration of specialized hardware, computer networks, non-visual interfaces, sensors or Internet technologies such as Voice over Internet Protocol (VoIP) and intranets.

Problem Identification

There was marked improvement in the quality of problem definitions. However, greater guidance is needed from teachers in the selection of topics. The vast majority of samples submitted documented problems related to information storage and retrieval. A few of the samples related to topics outside the scope of Information Technology.

Full marks were awarded for a complete and accurate description of the problem identified. Students who gained full marks in this section provided a background that established the context within which the problem occurred. From this background, the moderator was able to determine who the problem affected, the nature of the problem (performance, information, efficiency, control or security), its undesirable effects and who was seeking the solution.

Students who scored poorly lacked clarity in how they presented the problem statement. They only provided information regarding the context for the problem by stating the causes of the problem as opposed to the effects on affected individuals/organizations. Additionally, some of the problem definitions were too wide in scope and, as a result, failed to effectively focus on one major problem. In addition, many candidates included solutions within their problem definition that gave a bias that was evident throughout the project.

Gantt chart

Students who scored full marks for this component produced Gantt charts which included all stages of the problem-solving process, that is, from Problem Definition to Justification of the Solution. These students utilized special-purpose software (such as Milestones Simplicity) to produce accurate, well-labelled charts.

Students who lost marks made one or more of the following errors:

- Omitted activities (tasks)
- Did not provide realistic periods for some activities (tasks) listed
- Incorrectly arranged the tasks to be completed
- Did not use horizontal bars to show the duration of tasks
- Did not indicate start or end date of tasks
- Had the tasks all starting at the same time.

Analysis of the Problem

The majority of students whose samples were moderated were not able to score full marks for this section. Even though the use of three major fact-finding techniques was evident, the tools were used to collect demographic and other data that had nothing to do with the problem.

Students who scored full marks for this section recognized the role information plays in the problem-solving process as demonstrated by their use of appropriate fact-finding techniques to collect and analyse relevant data. These students

- applied at least three appropriate fact-finding techniques in the data collection process;
- processed quantitative data using a range of features provided by an electronic spreadsheet;
- analysed data in summary form to establish the cause(s) of the problem being studied.

Students who lost marks merely used one or more tools to collect data that provided information of very little value to the problem-solving process. Whilst interviews, questionnaires and observations were popular fact-finding techniques, not all of these were utilized appropriately. In some cases, a review of the documents used in the organization would have yielded information that is more useful. Additionally, some reports provided evidence of only one instance of an observation being carried out where it might have been necessary for several instances of observations to occur.

Identification of Possible Solutions

This component required that students identify at least two information technology solutions and should be much more than a statement. Ideally, it should include all or most of the following components:

- *Level of automation*
- *Processing methodology*
- *Network technology (LAN, Intranet, Internet)*
- *Software alternatives (custom software using a programming language or application development tool, productivity tool, commercial software or a turnkey system)*
- *Specialized hardware (non-visual interfaces, sensors, touch-screens)*

Students who scored highly provided details of how a particular tool or set of tools could be used to solve the problem identified. For example, instead of simply stating Microsoft Access, a student stated that *a relational database management tool such as Microsoft Access [could] be used to*

create an application that will be used by existing staff, after retraining, to record transactions, perform computations and print on-demand reports.

Students who lost marks for this section

- did not provide details of the solution but simply stated “implement a computerized system or use an automated record management system”
- stated identical solutions such as “implementing a record-keeping system using a database” and “implementing a record-keeping system using a spreadsheet”
- proposed more than one manual solution such as “employing more workers, changing the room in which the files are stored to a bigger size and changing the shelves to steel filing cabinets”. Whereas it is recognized that a non-IT solution is a valid option, providing two or more non-IT solutions is not justifiable, as the focus of the Internal Assessment is on IT-based solutions.

Evaluation of Possible Solutions

This component required that students objectively evaluate two or more of the solutions identified. Whilst most candidates paid attention to the cost of acquiring hardware and software, there was inadequate treatment of all the issues involved in personnel (training, hiring of trained personnel, redundancies and acceptance of the system), hardware issues (sourcing, types and maintenance) and software issues (versions and licensing).

A few students scored full marks; they undertook a complete evaluation of the technical, operational and economic aspects of the possible solutions such as:

- *Hardware tools*
- *Software tools*
- *Network and data communication services*
- *Costs such as acquisition/implementation and recurrent*
- *User issues such as recruitment, training needs, user interface*
- *Other issues such as time required for successful implementation, legal, environmental and technological fit*

These students appropriately utilized a spreadsheet to create a decision support worksheet for comparing potential solutions.

Selection of Solution

This component required that students select the most feasible solution based on the objective evaluation previously done. The selection of the optimal solution should take into consideration the resources required for implementation and those currently available. This component was fairly well done. Students who lost marks did not provide evidence to support their choice of the solution as most feasible.

Justification of Solution

This component required students to thoroughly analyse the issues related to the implementation of the proposed solutions, propose strategies for dealing with the issues, and provide an appropriate justification for all strategies recommended. Very few students gained full marks for this component, as they did not

- identify issues that may arise because of implementing the solution;
- recommend strategies for addressing the issues identified;
- thoroughly analyse the issues and appropriately justify the strategies recommended.

Presentation and Communication of Information

Under this criterion, full marks were awarded to projects that

- were well organized and structured;
- had a cover page, content page and abstract that were all complete;
- had a list of sources/references presented using either the APA or MLA guidelines.

Very few students scored full marks as their abstract was either incomplete or did not adhere to the rules stipulated by MLA or APA. In too many cases, the projects had numerous spelling and grammatical errors which suggested that the editing and proofreading features of the word processor were not utilized in the document preparation process. Students need to pay attention to the table of contents by assigning correct page numbers to respective pages or by using the appropriate feature of the word processor to generate one.

Recommendations

- Teachers and students should read the guidelines in the syllabus for the Internal Assessment *before* commencing the project.
- Students should be creative and choose a problem that occurs in their *immediate* environment (home or school). Innovative topics should be encouraged as opposed to the usual problems involving data storage and retrieval, inventory control and library systems.
- The project work should closely follow the teaching/learning activities related to each component of the project. For example, the Problem Identification should be completed
 - during a scheduled class session
 - after the lesson on *Problem Definition* is taught
 - after *Suggested Activities 1, 6, 7(a), 7(b) and 9 (pages 14–15 of the Syllabus)* are completed.
- The project report should adequately document the discussions, analyses and justifications required by the syllabus. The length of the report should be between 1500 and 2000 words excluding diagrams, graphs, tables and bibliographies.
- Teachers should ensure that the project report contains clearly defined, logically sequenced sections as suggested by the sub-headings in the mark scheme for Internal Assessment.

Paper 032 – Alternative to Internal Assessment

Candidates were required to demonstrate their knowledge and understanding of the problem-solving process. The responses of most candidates were poor, showing a lack of clear understanding of the problem-solving process and what is to be accomplished at each stage of the process. Although there was marginal improvement over last year's performance, most candidates still performed below the acceptable level. The overall mean score was 16.13 out of 60.

Question 1

Candidates were expected to produce a problem statement based on an IT-based problem that they had researched. In addition, they had to discuss two causes of the problem and explain a stage of the problem-solving process, other than problem definition and problem analysis. The mean score was 6.88 out of 20 marks. The highest score was 14 marks.

In Part (a), candidates who scored well provided a complete problem statement on an IT-based problem. However, most candidates chose problems that could not be defined as IT-based or provided a problem statement that was unclear, incomplete or ambiguous.

In Part (b), most candidates listed the causes while eliminating the discussion which was necessary to receive full marks. Several candidates stated outcomes, solutions or other problems as causes.

In Part (c), most candidates were unable to provide complete names for the steps (stages) in the problem-solving process, for example, some candidates gave a stage as "Identify possible solutions" whereas the name of the stage should be "Identify and Evaluate possible solutions" or, they were unable to give the steps (stages), therefore leading to poor marks in this section. The correct names for the stages can be verified by viewing Module 3, Objective 2 in the syllabus.

In Part (d), candidates were expected to identify the data gathering instrument to be used based on a given scenario and to provide a valid reason for their choice. Most candidates were able to easily identify the data gathering tool to be used for Part (d) (i) and Part (d) (ii). However, there was a variety of non-established fact-finding tools for Part (d) (iii). Candidates lost marks by providing justifications that did not pertain to the scenario or by defining the tools instead of justifying the tools.

In Part (e), most candidates misinterpreted the question. Instead of discussing the limitations of the data gathering tools when analysing the problem, they perceived it to be asking about the disadvantage of the tools and therefore lost marks.

Question 2

Based on their problem statement, candidates were required to identify and evaluate three possible solutions to the problem. The question was generally poorly done. The mean score was 3.69 out of 20. The highest score was 16 marks.

Most candidates did not answer Part (a) correctly. They mostly said that the need for two or more solutions was for contingency (as a backup implementation) should the first solution fail. However, marks were awarded to candidates who suggested that two or more alternatives would allow objectivity when choosing the most feasible solutions.

For Part (b), candidates generally did not identify IT-based solutions. Those candidates who did identify IT-based solutions failed to discuss the manner in which the proposed solution would solve their specific problem.

In Part (c), marks were not awarded for candidates' ability to evaluate, but rather to assess the IT-based solutions with respect to financial, technical and operational feasibility for each of the three solutions identified. Most candidates were able to evaluate based on the financial and operational feasibility of their solution; however, few candidates examined the technical feasibility.

Question 3

Candidates were expected to compare the possible solutions based on a consideration of the resources (cost, staff, hardware and software) required for implementation, and then to choose the optimal solution having weighed the implications. In addition, they were required to demonstrate how they would use the features of appropriate application software to produce a report, which included the problem statement and analysis of the possible solutions. The question was generally poorly done. The mean score was 5.56 out of 20 marks. The highest score was 14 marks.

Most candidates lost marks for the following reasons:

- The solutions were not IT based
- The justification of choice of the most feasible solution was incomplete or not based on weighing the implications of the possible solutions
- Failing to state the *type* of application software. Candidates were expected to name the type of software, which would have been a word processor. The majority gave examples of the type (for example, MS Word) for which no marks were awarded. Some candidates proposed other types such as spreadsheet or database. These answers were not considered, as neither was appropriate for producing a document based primarily on paragraphs and sentences.

Part (c) (ii) and Part (d) were generally well done by most candidates. They were able to identify distinct features of the type of software and explain the features to be used in developing the document. They appropriately justified the application software capable of presenting the results of the analysis of the problem.

UNIT 2

Paper 01 – Multiple Choice

This paper comprised 45 items, 15 items per module. Most candidates performed satisfactorily. Marks on this paper ranged from a minimum of 10 to a maximum of 41. The mean mark for this paper was 58.41 per cent.

Paper 02 – Structured Questions

This paper consisted of nine compulsory questions, three questions per module. The maximum score was 100 out of 150. The mean score was 52.74, compared with 42.05 in 2010.

In Unit 2, while students performed creditably on Sections II – Use of Information Technology Tools and III – Social, Organizational and Personal Issues, they encountered several challenges on Section I – Information Management.

Section I – Information Management

Question 1

Candidates were assessed on their knowledge and understanding of the differences between flat file and database structures as well as on concepts such as data warehouse, data mart and data mining. This question was poorly done by most candidates, suggesting that the concepts were not covered in-depth.

In Part (a), candidates were required to discuss two of the shortcomings of flat files for storing and managing data. Candidates were expected to highlight the inherent weaknesses of flat file structures that database structures were designed to overcome. Weaknesses included *high levels of data redundancy* and *data isolation, data inconsistency* and *poor data security*. Candidate responses demonstrated that some had an idea of what a flat file is and how it is different from a database. However, many candidates could neither identify nor elaborate on the weaknesses of flat files.

Based on the responses given for Part (b), there are obvious misconceptions about the terms ‘data warehouse’, ‘data mart’ and ‘data mining’. This was evidenced by incorrect responses such as:

- Data warehouse is a building or institution that house data
- Data mart is a place where data can be bought and sold
- Data mining is taking care of data gently.

However, candidates who gave full responses explained that:

- *Data warehouse is a huge database that stores and manages data required to analyse historical and current transactions*
- *Data mart is a smaller version of a data warehouse that helps a specific group or department to make decisions*
- *Data mining is a process used to find patterns and relationships among data in a data warehouse or data mart.*

In Part (c), candidates were required to apply their knowledge and understanding of databases, data warehouse, data mining and the Internet to assist the management of a multinational retail organization, with branches on five continents, in determining what products the company should carry in its stores for an upcoming holiday event. There was obvious difficulty for candidates to link their knowledge of concepts to the situation faced by the multinational company. The responses were varied, but generally, candidates simply listed some of the services available on the Internet and then described what a database is, without accurately or adequately discussing how either could assist the management in decision making. A suggested response for the steps to be taken by the management is as follows:

- *Use the databases in the separate locations to create a single distributed database (data warehouse)*
- *Access by a single (client server)*
- *Access data warehouse via the Internet using a VPN*
- *Use data mining techniques to find patterns among the data about customers' likes and dislikes*
- *Make decisions on what products to carry*

Recommendations to Teachers

- Encourage students to develop an IT dictionary of popular terms and concepts to aid them in learning definitions of IT words
- Use a variety of real-life scenarios to ensure that students become familiar with developing solutions.

Question 2

This question assessed candidates' ability to construct data flow diagrams. Of the three questions in Section I, candidates responded most satisfactorily to this question. The mean mark was 5.24 out of 15.

Part (a) required candidates to name three of the symbols that can be used in a data flow diagram (DFD). Responses from candidates were generally accurate, with only few citing incorrect responses.

Part (b) (i) required candidates to identify one entity, one data store and two data flows from a given POS scenario. Most candidates did not give the correct responses. An incorrect candidate response and a suggested response for the given POS scenario are shown below.

Item Required	Student's Response	Suggested Response
One entity	<input type="radio"/> Barcode	<input type="radio"/> Cashier or Customer
One data store	<input type="radio"/> Item ID	<input type="radio"/> Item or Inventory Database
Two data flows	<input type="radio"/> Total to be paid by customer <input type="radio"/> Cashier scans each item	<input type="radio"/> Payment <input type="radio"/> Barcode or Item ID

For Part (b) (ii), candidates were required to draw a Level-1 DFD. Most candidates were unable to utilize the correct symbols to draw a logical DFD. Common errors were using nouns for processes and writing full sentences for data flows.

Part (b) (iii) assessed candidates' ability to use their analytical skills in suggesting a change that should be made to the DFD drawn in Part (b) (ii) for those customers who were allowed to pay at the end of the month. Most candidates had difficulty with this section. Many candidates modified their DFD, rather than providing a statement of and justification for the change that was to be made.

For example, an expected response would be *the addition of another data store to store the data on the customer who were being allowed to pay at a later date, as well as including the amount owed.*

It is recommended that candidates be exposed to various scenarios where they can make changes to data flow diagrams and justify reasons for such changes.

Recommendations to Teachers

- Ensure that students are able to differentiate between context level and Level 1 DFDs;
- Emphasize the use of correct DFD symbols
- Ensure that students understand the purpose of each symbol and are able to differentiate between DFD and flow chart symbols
- Explain and illustrate how to move from a description of a system to context level and then to Level 1 DFDs
- Ensure that students are aware of the rules in developing DFDs and the proper naming conventions for entities, data stores, data flows and processes
- Use a variety of exercises to ensure that students become familiar with constructing and modifying DFDs.

Question 3

This question assessed candidates' ability to name and describe database models; apply normalization rules to remove normal form violations; draw Entity-Relationship (ER) diagrams and write SQL commands.

Candidates performed poorly on this question. The mean mark was 5.66 out of 20.

In Part (a), candidates were required to name three types of database models. Overall, good responses were received from candidates. Most candidates could recall *hierarchical*, *relational* and *object-oriented models*. Additional valid responses included *dimensional* and *object relational* models.

In Part (b), candidates lacked the depth expected in their responses. Most candidates were able to provide the example for the relational database, however the other models were poorly represented.

In Part (c) (i), candidates were generally able to provide the responses expected. Correct responses for the entities included the *module*, *programme*, *semester* and *grade*. For Part (c) (ii) (a), most candidates were able to include three of the four attributes required in the response. However, identification of all attributes forming the primary key seemed to be a problem. Most candidates also failed to represent the 3NF using the standard notation.

For Part (c) (ii) (b), most candidates were able to identify accurately only one of the two relationships required in the diagram. A significant number of candidates were unable to identify the correct cardinalities.

Part (c) (ii) (c) was poorly done. Candidates were unable to write any of the two SQL commands required. The correct commands required were:

- SELECT + ORDER BY
- SELECT FROM + ORDER BY

Recommendations to Teachers

- Use examples to demonstrate the process of normalization, starting with tabular ‘un-normalized’ data. Students would then better appreciate the differences between normalized and un-normalized data.
- Ensure that students practise the drawing of ER diagrams, paying particular attention to cardinalities between relations
- Provide examples of ‘inaccurate’ ER diagrams and ask students to explain why the cardinalities are not correct
- Ask students to write SQL statements and to state their result sets. This will assist them in developing correct SQL statements.

Section II – Use of Information Technology Tools

Question 4

This question assessed candidates’ knowledge and understanding of the features and functions of presentation software tools. Candidate performance was unsatisfactory. The mean score was 4.01 out of 15.

In Part (a), candidates were required to state three functions of presentation software that are available with a multimedia projector and that are not available with an overhead projector. Based on the majority of responses, candidates seemed not to be aware of the differences between the presentation software (with a multimedia projector) and an overhead projector. Examples of acceptable response from candidates included

- *Insertion of sound in the presentation*
- *Use of animation in the presentation*
- *Use of video clips in the presentation*

In Part (b), candidates were required to discuss three factors that should be considered when designing effective multimedia presentations. Generally, candidates responded satisfactorily to this question. However, some candidates did not provide clear explanations or reasons as to why these factors are important considerations. Candidates who gave good responses discussed some of the following factors:

- *The avoidance of too much information on one slide, that is, statements on slides should be bulleted and not in paragraphs to ensure information is easier to read and understand.*
- *The content should be appropriate for the intended audience, for example, graphics, pictures and colours should be utilized when presenting to children.*
- *The adoption of a clear layout format to ensure the font size, colour and style are legible to all participants.*

In Part (c), candidates were expected to explain the term ‘macro’ and to apply their knowledge of a macro to make a change on a 34-slide presentation. This section was not done well. Generally, poor

definitions such as ‘a macro refers to large or the outside world’ were provided. It was evident that candidates were unfamiliar with the macro feature in presentation software.

Examples of acceptable response from candidates were:

- *Macro: a user-defined object which allows the user to record the steps they desire. The macro is then able to perform these steps without the user’s involvement. Macros are reusable.*
- *How to create and execute macros to make the change on all slides using Wizard:*
 - *Select record macro from the toolbar*
 - *Select the title of the slide and replace the word ‘Computing’ by typing ‘Information Technology’*
 - *Stop recording*
 - *Run macro*

Recommendations to Teachers

- Explain and demonstrate *advanced features* of presentation software to students
- Review the use and function of the popular productivity tools.

Question 5

This question examined candidates’ knowledge and understanding of tools used to access and retrieve information from remote sources as well as their ability to critically evaluate pieces of information based on the sources from which the information come. Most candidates performed satisfactorily on this question. The mean score was 6.66 out of 15.

Part (a) of the question was not done satisfactorily. Few candidates were able to give three Internet tools that could be used to retrieve information for the research topic. Many candidates gave responses such as wikis, blogs and websites which are themselves information sources. For those candidates who responded correctly (web browsers, search engines, Usenet, IRC, etc.), most were unable to provide any reason for their selection of the particular Internet tool.

For Part (b), using three scenarios presented, candidates were expected to identify *the most appropriate hardware* tool that the doctor could use to send or obtain information and to provide two reasons for their responses. The main areas of weakness identified were:

- Many candidates did not identify the *most appropriate* hardware tool and, in some instances, suggested software tools such as email instead. For example, the most appropriate tools that the doctor should use to consult with a colleague, who was only 100 meters away, would be a telephone. Neither a computer with online chat nor an email system would be appropriate.
- Other candidates responded with technological trends/concepts (e.g. Bluetooth — a proprietary open wireless technology standard for exchanging data over short distances) instead of hardware devices.

Recommendations to Teachers

- Students must be urged to get familiarize themselves with the objectives of the syllabus.
- Students must learn about different tools (hardware and software) that may be used in sending and obtaining information or in communicating with others.
- The advantages and disadvantages associated with the use of each of these tools must be taught.

Question 6

This question examined candidates' ability to solve real-life problems with the use of productivity software tools, based on their understanding of what these tools were designed to accomplish. Most candidates performed satisfactorily. The mean score was 9.36 out of 20.

In Part (a), candidates were expected to list three criteria, other than the 'nature of the solution', that could be used in the selection of IT tools for a given problem. Less than one per cent of those who attempted the question earned the full three points allocated. It was evident that candidates were unfamiliar with the specific objective in the syllabus. Examples of acceptable responses from candidates were:

- *Type of analysis required*
- *Type of storage*
- *Type of data*

In Part (b), candidates were expected to state the primary purpose of five popular productivity software, that is, what each software was designed to do. Candidates were also required to fully describe how three of these software packages could assist a school in planning a barbeque event. Most candidates were able to state the primary purpose of each of the five software packages.

However, candidates lost marks because they were not able to fully describe how the software could be used in the planning of the event. Examples of acceptable responses from candidates included:

- *Word Processing: create and manipulate documents containing mostly text and sometimes graphics. Examples include letters, memos and reports.*
- *Desktop Publishing: used to create sophisticated documents containing text, graphics and high quality colour schemes.*
- *Spreadsheet: to organize data and information into columns and rows so formulae can be used to make time consuming calculations very easy. Also uses features such as graphs for the display of data.*
- *Presentation: to create visual aids incorporating text, graphics, audio, video, graphs and clip into electronic slides for presentations and communicating ideas/messages*
- *Database Management: to store, organize, manage, retrieve and search for data stored in a database with relative ease. Allows for display of data using reports.*

Uses

- *Word Processor: could be used to create form letter and then use mail merge to generate letters to send to sponsors and artistes to tell them about the event.*
- *Desktop Publishing: can be used to create posters and tickets with appealing colour schemes to attract outsiders.*
- *Database Management: can be used to store scheduling of activities at different times of the day as well as keep records of ticket distribution and payments.*

In Part (c), most candidates misinterpreted what the question required of them and as a result used general information from Part (b) (i) in answering this question. Candidates were asked to state the most appropriate format to be used in presenting the information for two given scenarios. Examples of acceptable responses from candidates were:

- *Line Graph or Bar graph: shows the peaks and drops in sales without excessive data. A line graph is easy to read and can use colours, hence is very appealing to the eye making the presentation fun and valuable*
- *Graphics (Drawing of the house): A drawing of the layout of the house will show where each room is to be situated and the dimensions of each room. This can be used to determine how the house is to be constructed.*

Section III – Social, Organization and Personal IssuesQuestion 7

This question assessed candidates' knowledge and understanding of the power and potential pitfalls of Information Technology by having them examine (a) the possible threats posed to a company's computer systems and (b) the benefits to be derived, either by citizens or a government department, when kiosks are installed in a remote village. The kiosks provide online access to services offered by the government department. Most candidates performed satisfactorily on this question. The mean score was 7.85 out of 15.

In Part (a), when asked to state how the areas listed could be a threat to a company's computer system, many candidates simply provided one-word or short-phrase responses, for example,

- Natural disaster — a hurricane, flood
- Employee — theft of hardware, spread virus
- Data errors — inaccurate data
- Hardware — disk failure

However, candidates were expected to show how each of these may be a threat. The more appropriate responses were:

- *Natural disaster – such as a hurricane could cause flooding, which in turn would cause damage to hardware.*
- *Employee – the theft of hardware such as a mouse or keyboard, use of the system will be restricted until the stolen item is replaced or via the spread of a virus which could result in the company's computers becoming inoperable.*

- *Data errors – entering inaccurate data leads to incorrect balances on customers’ statements or can cause the management to make a wrong decision which may prove to be costly.*
- *Hardware – disk failure causing the company’s system to be down for several hours/days.*

Recommendations to Teachers

- Use CASE studies to assist students in understanding the various threats/benefits associated with the use of IT to the society, companies and individuals;
- Provide students with the definitions of terms, for example, *state how, discuss, explain*, etc. (see glossary in the syllabus).
- Ensure that students become familiar with IT jargon such as malware, vulnerability, countermeasures, etc.

Question 8

This question examined candidates’ knowledge and understanding of malware as well as their ability to distinguish between different pairs of malware and to provide precautionary strategies to eliminate the threats of malware and employees. Most candidates performed satisfactorily on this question. The mean score was 6.15 out of 15.

For Part (a), candidates were generally able to correctly identify two popular types of malware – worms and Trojan horses. A few candidates had a different interpretation of the term ‘malware’ and therefore responded by giving the ways of gaining illegal access to a computer system such as SPAM, spoofing, hacking and phishing.

For Part (b), most candidates were able to describe each malware, but some failed to show how each is different, that is, what the distinguishing features are when compared with another.

Part (c) was generally well done as many candidates were able to identify and discuss three different precautionary measures that could be used to combat malware. A few candidates simply listed the three precautionary measures and did not go in-depth to explain the purpose of the measures identified. Also, in some instances, candidates coined different terms for precautionary measures, for example, anti-malware, anti-popup, and anti-blocker. Some candidates were not able to distinguish between a firewall and an anti-virus.

For Part (d), some candidates were able to correctly identify one mechanism that an organization can employ to govern employees’ use of the computer systems and to protect the systems from internal threats. However, the majority of candidates confused this part of the question with the other three parts, in that, they focused their responses on protecting the computer system from malware only rather than from misuse by employees and internal threats, for example, restricting the use of the Internet by employees. Some candidates did not give any indication as to how the mechanism would be enforced or how the mechanism would protect the system from potential threats.

Recommendations to Teachers

- Ensure that students can identify the various malware and can correctly spell and define them.

- Have students research the various malware that exist, paying particular attention to the major differences among them
- Ensure that students are aware of the various precautionary measures that can be used to combat malware and provide literature on the specific use of each
- Incorporate simulations of how malware work into lessons to cater to the various learning styles in the classroom;
- Ensure that students are able to distinguish between internal and external threats;
- Encourage students to read questions carefully before answering to prevent misinterpretations;
- Encourage more critical thinking in the classrooms and present real-life scenarios so students can identify various mechanisms to deal with computer threats in different situations.

Question 9

This question tested candidates' knowledge and understanding of legal and ethical dilemmas that organizations and individuals face arising from the use of IT systems. Most candidates did not perform as well as expected on this question. The mean score was 6.15 out of 15.

In Part (a) (i), most candidates were able to identify types of works that may be considered intellectual property. Some candidates listed copyright, patent and trademark as pieces of intellectual property. A few candidates gave the medium/vehicle used for dissemination such as literature, CD, DVD etc.

In Part (a) (ii), candidates were expected to provide one similarity, other than forms of intellectual property, and one difference between copyright and patent, and between trademark and patent. Generally, this was poorly done by most candidates. Few candidates were able to adequately account for a similarity and a difference between the pairs of intellectual property types. Most of the other candidates responded with definitions instead. There were cases where candidates were able to give a similarity but struggled to give the difference.

In Part (b) (i), many candidates were able to identify possible reasons why a piece of work can be considered as plagiarized. However, there were candidates who repeated the same response in a different way, and as such, full marks could not be awarded. Some candidates spoke generally about plagiarism instead of relating to the scenario given.

In Part (b) (ii), candidates were expected to identify three possible consequences that could result from the act of plagiarism. Most candidates were able to state at least two of the consequences of plagiarism. Candidates who scored well on this question mentioned consequences such as:

- *A failing grade on the assignment*
- *A failing grade for the course*
- *Student may be suspended or expelled*
- *Loss of credibility and integrity*

Candidates performed very well on Part (c). For the most part, they were able to give explanations of the ways in which technology can be used to assist visually impaired and physically challenged persons. Some candidate responses showed that they were familiar with technologies that are currently used and those that are currently being researched.

Recommendations to Teachers

- Give students activities such as projects, presentations and so on, that will allow them to be familiar with the different types of works that may be considered intellectual property.
- Encourage students to keep a glossary of terms and given activities that will help them to clearly identify the differences between patent, copyright and trademark.
- Give students different scenarios that will widen their knowledge about the various things that can be taken into consideration for a piece of document to be considered as plagiarized. They can be given projects or different documents to review.
- Give students activities that will allow them to be familiar with the consequences of plagiarism in various settings. Research, projects and presentations can be used to assist with this, wherever necessary.
- Encourage students to conduct research on the various emerging technologies and how they can improve peoples' lives, their work and entertainment. There are several computing websites and magazines that provide valuable, up-to-date information on these areas.

Paper 031 – School-Based Assessment (SBA)

This project enabled students to demonstrate their skills and competence in using IT tools to assist them in developing a solution to a problem.

Problem Identification

Full marks were awarded for a complete and accurate description of the problem identified. Students who scored well provided a background that established the context within which the problem occurred. From this background, the moderator was able to determine who the problem affected, the nature of the problem, its undesirable effects and who was seeking the solution. However, most students merely wrote a single sentence for the problem, providing no background in which the problem occurred. In addition, a few students were ambiguous in their problem description, which could have resulted in several interpretations.

A limited range of problems were identified and related to the management of records in educational, medical and retail establishments.

Analysis of the Problem

Most students did not describe their findings from the various data-gathering activities done. In the analysis phase, students were expected to conduct a study of the problem, using two or more tools (questionnaires, interviews, observation and review of documentation) to determine what the facts/issues were concerning the problem. This would assist students in identifying the actual causes of the problem, rather than relying on persons' perceptions. This phase also affords students the opportunity to refine the problem statement.

Identification and Justification of IT Tools

Students were required to use productivity and/or web tools to implement their solutions. Although most students were able to identify productivity tools that could be used to assist them to solve the problem, many were unable to adequately justify the use of these IT tools. A few students identified tools that were not in keeping with the requirements of the syllabus such as global positioning systems (GPS), networking and voice recognition systems. Whilst hardware devices (such as bar code readers) and point of sale systems are IT tools, the syllabus is very specific about the subset of IT tools that are acceptable for use in creating the solution.

Assessment of the Implications of the Solution

This section proved challenging to most candidates. Many candidates provided statements on the issues, rather than a discussion of the issues. Only a few candidates mentioned strategies that could be employed to address the issues raised.

Implementation of the Solution

Appropriate Use of IT tools and their features

Most candidates' use of the IT tools in implementing their solutions was appropriate. For example, the word processor was used to generate form letters and the spreadsheet application to 'crunch' numbers. However, most candidates did not exploit the most appropriate features of the tool in implementing their solutions, especially, when using the database management system. No security features were in evidence, the 'form' feature was not used for data entry and queries were not used to build reports.

Human Computer Interface

For the database or web page component, the solutions revealed limited use of navigational features and labelling. Some solutions did not employ navigational features or buttons, for example, tab keys, arrow keys, BACK, NEXT, PRINT, CLOSE.

Working Solution

Although the majority of solutions were satisfactory, some of the solutions did not meet the minimum criteria as stipulated in the syllabus.

Recommendations to Teachers

- Students should be encouraged to identify a problem that exists in their environment (school or community) and for which an IT-based solution is a feasible one.
- Students should be encouraged to use features such as form, report and query when building databases.
- To assist in the construction of web pages, students should refer to the recommended text, *Computer Concepts*, or any other suitable source for guidance.

Paper 032 – Alternative to SBA

This paper tested candidates' ability to apply appropriate features of software tools in developing solutions to a problem encountered in their environment (school or community). Even though there was a notable improvement in performance, most candidates performed below the acceptable level. The overall mean was 16.80 out of 60.

Question 1

Candidates were required to produce a problem statement based on an IT-based problem that they had researched. In addition, they should discuss three causes of the problem, two data gathering tools that could be used to assist them in analysing the problem and the limitations in using these data gathering tools. This question was poorly done by most candidates. The mean score was 6.2 out of 20. The highest score was 17 marks.

For Part (a), most candidates did not provide a complete, clear description of the problem. This should be done against a background that established the context within which the problem occurred. A candidate that responded well wrote the following as a problem statement:

The retrieval of files from the manual filing system presently implemented is adversely affecting the productivity of the organization.

For Part (b), several candidates confused *causes* of the problem with *symptoms/outcomes* of the problem. A cause is defined as “that which produces an effect”, whereas an outcome is defined as “a consequence”. Three causes of the problem described above were as follows:

- *Inadequate number of filing cabinets*
- *Unorganized manner in which the files are stored; staff usually place files in any cabinet with space or those close to them*
- *Untrained staff*

For Part (c), most candidates were aware of the tools that could be used in carrying out data gathering activities.

For Part (d), a few candidates were able to provide the steps in the problem-solving process, once the analysis stage was done. Other candidates either confused the problem-solving process with the SDLC or failed to read the question, and therefore gave responses which included steps such as maintenance and implementation.

Question 2

Based on the IT-based problem stated in Part (a) of Question 1, candidates were expected to identify and justify the use of four features of two software applications that would assist them in solving the problem. Candidates performed below the acceptable level. The mean score was 6.4 out of 20 marks. The highest score was 11 marks.

Although most candidates were able to identify two software applications that could be used to solve an IT-based problem, they were challenged to identify and show how specific features of the software would assist in their solution.

Candidates were expected to identify the specific features of the software applications which would address the causes of the problem or assist in solving the problem. For example, if a cause of the problem is *that errors are made when a secretary writes the names and addresses of persons on labels or envelopes, or letters to parents/guardians of students are delayed as there are hundreds to be addressed*, then the mail merge feature of the word processor would eliminate/minimize the cause.

Candidates simply responded with, using the word processor for example, cut and paste, word art, word count and insert pictures; features that are often used in creating textual documents. Similarly, the responses provided by candidates for the spreadsheet and database applications did not address the specified causes of the problems or assist with the problem solution.

Question 3

Candidates were required to demonstrate their knowledge and understanding of issues (threats to their computer systems, training, hiring of staff, legal, ethical, environmental, etc.) that should be considered before IT solutions are implemented. This question was very poorly done by most candidates. The mean score was 4.2 out of 20 marks. The highest score was 11 marks.

Most candidates were able to state at least one area of concern, other than costs, that should be addressed: *training, hiring, or maintenance of the system*. However, for these areas of concerns, they were only able to explain the negative impact from a cost perspective. For example, with respect to training, a company would have to spend money to train employees. Other negative implications were not given, such as a reduction in productivity if members of staff are trained during business hours or system failure as a result of inadequate maintenance.

Most candidates failed to outline any strategy to minimize the negative consequences that may arise when areas of concerns are not addressed.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION**

MAY/JUNE 2012

INFORMATION TECHNOLOGY

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GENERAL COMMENTS

This year, there was a decrease in the number of candidates who sat the examination: 944 candidates compared with 1133 in 2011 for Unit 1 and an increase from in Unit 2 from 534 candidates in 2011 compared to 554 in 2012.

In Unit 1, the performance of the candidates on Paper 01 was higher than 2011. However, Paper 02 and Paper 03/2 (Alternative to the Internal Assessment) was lower than the performance for 2011. The performance on Paper 03/1 was marginally higher than in 2011. For Unit 2, the candidates' performance was better on Paper 01 and 02 but lower in Paper 03/2 when compared with 2011. However, there was a decline in performance on paper 031(SBA).

A few Candidates scored full marks on Questions 1, 5, 7 and 8 in Unit 1 and on Questions 4 and 5 in Unit 2.

It was noted that a number of candidates were providing responses that were 'outside' the domain of Information Technology. Terminologies and concepts have specific meaning within the realm of Information Technology, and therefore 'everyday' meaning of these terms and concepts would result in candidates providing inappropriate responses. A glossary of IT terminologies and concepts would aid students in this regard.

In addition, the responses of a number of the candidates to items, which assessed the high order skills (Application and Analysis, and Synthesis and Evaluation), continue to be of concern to the Examining Committee. Responses were generally not at a level desirous or indicative of an advanced proficiency. Students are still operating generally at the Knowledge and Comprehension level. This is very problematic for questions requiring higher order thinking skills.

Students should be encouraged to pay particular attention to the marks allocated to questions and be guided so as to respond accordingly. Also, the importance of reading the questions carefully before attempting to respond cannot be overstated.

To address the concerns regarding the quality of responses to questions, which use such verbs as **explain, justify, evaluate, examine and distinguish**, teachers are encourage to include more of such questions on internal examination papers and for homework assignments. It should be noted that a glossary of these terms can be found in the syllabus. Teachers should ensure all aspects of the syllabus are covered.

DETAILED COMMENTS

UNIT 1

Paper 01 – Multiple Choice

The paper was comprised of 45 items, with 15 items per module.

Most candidates performed satisfactorily. Correct responses from candidates on this paper range from 11 to 44. The mean score on the paper was 59.51 (out of 90). Most candidates performed satisfactorily.

Paper 02 – Structured Questions

The paper consists of nine compulsory questions: 3 questions per modules. The maximum score was 107 out of 150. The mean score on the paper was 51.52, compared to 52.55 in 2011.

Section I – Fundamentals of Information Technology

Question 1

All candidates attempted this question. Candidates were expected to clearly demonstrate their understanding of the concept of “Information Processing”. They were also required to, identify different types of Information Systems used by organisations and demonstrate an understanding of the functionality of any one. Students were also expected to demonstrate a working understanding of data capture methods and strategies for ensuring data quality. Most candidates performed satisfactorily. A few candidates scored full or very high marks.

In part (a), too many candidates did not appreciate the difference between **Data** and **Information** in their response. Hence, a significant number did not highlight the transformation of data into information via Information Processing. Also, many candidates did not refer to the use of computers and other technology tools in their answer. As a result, candidates only earned one of the two marks allocated.

In part (b), (i) Most candidates were able to state three other types of Information Systems. However, some were not accurate in naming those other systems. For example, some would write Transition Processing System (TPS) for Transaction Processing System or Management System for Management Information System. It is imperative that the correct terms be used in responses.

In part (b) (ii) A significant number of candidates were unable to state clearly the main function of one of the Information Systems they had listed. Most candidates chose to give the main function for a Management Information System or an Expert System. Candidates incorrectly stated that an MIS was used for managing Information Systems instead of a tool for aiding managers make decisions.

In part (C)

- (i) Most candidates identified the data capture methods. A few incorrectly identified qualitative and quantitative data as data capture methods.
- (ii) Many candidates were unable to outline how their suggested methods contributed towards the accuracy of the data inputted. For instance, they would simply suggest the use of multiple choices on the questionnaires but did not explain why this would contribute towards accurate data being inputted and stored. Another example is that they would suggest validation and/or verification but no analysis would be made as to their contribution in achieving data accuracy.

Recommendations to the Teachers

- Attention should be given to details on common concepts and terminologies in this unit. Specifically, strategies to understand fundamental information processing and information systems concepts should be developed.
- Opportunities to apply core knowledge areas to specific contexts and scenarios should be given closer attention.
- Students should develop their communication and writing skills in order to offer specific and precise responses.

Question 2

This question assessed candidates' knowledge and understanding of the types of information used by organisations, individuals and information systems. This question also examined students understanding of issues associated with the presentation of information for maximum impact . Most candidates performed at an acceptable level. A few candidates scored very high marks (over 80% of the marks allocated). Six per cent of the candidates scored zero.

Part (a) examined students understanding of different types of information and the likely users and the purpose for which the different types of information are used. Most students were able to define the terms Strategic, Tactical and Operational information correctly. However, some students did not interpret the question correctly and as such were not able to expound on the purposes for which these types of information will be used.

Part (b) students were asked to examine a specific system (an ATM in a bank) and identify different types of information described in part (a). Generally students failed to demonstrate a transition from a definition o to an actual situation. Students failed to identify, with reference to an ATM, each type of information described in part (a) of the question.

Part (c) required candidates to demonstrate an understanding of information presentations. This section was generally well understood and correctly answered. Students were able to identify tools to help solve the professor's problem. However, they could not fully explain how the tool would enhance the impact of the presentation.

Recommendation to the Teachers

- Teachers need to create linkages to generic post in organizations that use the various types of information. This will allow students to answer questions which are not specific but will use their general knowledge to answer these questions.
- Teachers need to generally use scenarios to help students understand the application of the concepts in the syllabus.

Question 3

All candidates attempted this question. This question assessed candidates' knowledge and understanding of emerging technologies such as social network sites, mobile and smart phone technology use. The question was generally well done at an acceptable level by most candidates. A number of candidates scored very high marks.

For Part (a), candidates were required to identify three ways in which using social networking sites can enhance the teaching and learning process. Most candidates were able to get the six marks that were awarded in this section of the question.

Part (b) (i) required candidates to identify the hardware components that are needed for connecting to the internet. In general, candidates were able to identify the particular devices needed to connect to the internet. A few candidates of the candidates gave general hardware devices of a computer system and not the hardware devices specific for internet connection.

In Part (b) (ii), candidates were required to identify the advantages and disadvantages of using mobile phones to access the internet. While most candidates were able to state advantages and disadvantages they were not able to give substantial explanations for them.

Part (c) of the question assessed candidates' ability to use existing IT tools to solve real and relevant problems. Responses from the candidates were poorly done, as they could not state how the files video could be shared or how the student can access the school networks. Some of the candidates identified the IT tools but did not clearly understand the meaning of the terms and how the technology works. They used IT terms loosely.

Recommendations to the Teachers

- IT is a technical subject. Candidates must know the meaning of IT terms and use those terms correctly and give appropriate IT examples. Teachers should encourage students to compile an IT dictionary.
- Teachers should reinforce how IT can be used to solve real life problems as well as the advantages and disadvantages of using different IT tools.
- Teachers should keep up to date with emerging technologies and engage students on their application and useful. Encourage students to share their experience and understanding of emerging technologies in the context of their engagement with the syllabus.

Section II - Information Technology Systems

Question 4

This question was designed to examine the candidates' knowledge and understanding of Information Systems. This item was generally done at an acceptable level by most candidates. A few candidates scored very high marks. Five percent of the candidates, who attempted the question, failed to score any mark.

Part (a)

Candidates were expected to define the term "software portability". Of the candidates who attempted this part, only two students got the full two marks with the majority scoring 0. Candidates lost marks because they could not related software portability . The answers were too general and not specific to source code.

Candidates were expected to state that software portability means that software should function without changes to the source code in various software environments.

Two examples of appropriate candidate responses are shown below:

- *This can be defined as if the software can be successfully installed in for example. Windows 7, Windows XP and still work, and provide its function.*
- *Software Portability is used to describe how easily one software can work on a different computer brand/version and/or operating system without any bugs or the need to build from scratch*

Part (b)

Candidates were required to state how one characteristic of Hardware, Software and User can affect the speed of an Information Technology System. Majority of the Candidates scored two (2) of the three (3) marks for this part.

The majority of the candidates received the mark for the characteristic of the user. A few were able to state the characteristics for the software and hardware.

The expected responses should have been

- Hardware: Speed of processor; capacity of the memory; outdated hardware
- Software: Software difficult to use; user-friendly User Interface; large-code base; uses too much memory; has too many bugs/errors
- User: inexperienced user/educational background; users making too many mistakes;

An example of a candidate response is shown below

- *Outdated Hardware: such as limited processor power or RAM availability; as is the case of many older systems*
- *Software: the way the software programmed; has bugs*
- *User skill level: if the user is inexperienced they would have difficulty operating certain systems*

In Part (c), Candidates were required to state and discuss how biometrics, username and password provide authentication and security to Information Technology System. This part of the questions has three (3) subparts.

- (i) : This part required candidates to state two biometric scans used to authenticate users. The majority of the candidates were able to amass all two (2) marks. Suggested answers should have been hand geometry, finger print scan, palm scan, retina scan, iris scan, signature verification, facial recognition, voice recognition.
- (ii): This part required candidates to discuss two major concerns that users may have with respect to a biometric-based authentication system. Most Candidates received only one (1) mark out of the two (2) marks allocated as most responses simply list the concerns and failed to adequately discuss the various concerns. Candidates wrote about the system itself rather than the concerns associated with using the system.

Suggested responses should have been

- Feelings of discomfort – users may not feel comfortable with their fingerprints, palm, and voice patterns being stored on the computer where personnel can access them.
- Health Concerns – scans can affect eyes and skins; also many users using machine can leave germs behind to infect others
- Religious concerns – persons may feel that there are spiritual implications involved.
- Malfunction of system – users feel that when the system is not working they might not have access to important documents and rooms
- Personal safety – users may feel that their safety might be at risk if they are attacked due to the fact that their body parts might be needed for authentication by unauthorized persons.

- (iii): This part required candidates to outline the advantages of using a combination of biometrics, username and password to authenticate users. The majority of the candidates amassed only two (2) marks of the four. Again candidates ignored the word outline and merely stated the advantages. Also most candidates, who talk about security issues, restated the point in both advantages. Candidates also did not talk about the authentication working as one but misinterpreted this part thinking that if one fails then the other will allow access.

Suggested responses should have been

- Increase the strength of security – the authentication system will be stronger as now there are two authentication methods in place and two is often times stronger than one
- Increase confidence of users – users will feel more comfortable when there are two methods in place to protect persons, files and equipment.

An example of an acceptable response from a candidate is shown below

Part (c)(i) – Two biometric scans are: finger print scan and retina scan

Part (c)(ii) –

- There are health concerns: persons are being exposed to a vast amount of radiation. The fact this scan very often can result in health defects
- Health concerns: Users may be concerned that the light that is coming from the machine that does the optical scanning maybe harmful to the eyes:
- Safety concern: users may think that if they are supposedly killed or amputation is done other persons using the amputation hand can be authenticated.

Part (c)(iii)

- The use of biometrics ensures that only one or a group of specialized persons have access to the data and or information.
- The combination of all three, biometrics, username and password pose a much harder task for unauthorized access
- Outsiders would be more discouraged from breaking into the system as it would seem harder to break into than if only one of these methods were in place.

Recommendations to the Teachers

- i. Students should be encouraged to read all questions thoroughly, paying special attention to key words and phrases in an effort to understand the requirements of the question.
- ii. Teachers should provide increase opportunity for students to practice written responses to exam type of questions in an effort to answer questions according to the allotted weight.
- iii. Students should be encouraged to have a personal copy of the syllabus and use it to support topics covered.

Question 5

This question was attempted by 98% of the candidate population. It was designed to examine the candidates' knowledge and understanding of Human Computer Interfaces and their application in specific contexts. This question was poorly done by most candidates. Nineteen per cent of the candidates, who attempted the question, failed to score any mark.

In Part (a),

This section tested candidates ability to differentiate between the Command Line Interface (CLI) and the Graphical User Interface (GUI). Most candidates were unable to give two advantages of the CLI over the GUI.

Suggested Response:

- Personal preference and experience - for tech savvy users, for example, system administrators, the preferred choice of working is from the command line. Users prefer to work in this mode because they might be experienced with it.
- Command. User feels more in command and in control of the system. Can get a lot more done.
- Speed - it can be faster to get a job done via the command line, by typing in commands, over using the mouse to get the same job done using a GUI. Entering commands on the keyboard for an experienced user could be faster than entering commands using the mouse.
- Sense of pride or accomplishment to be able to do the same job in a more technical manner.

In Part (b)

- i. This question sought to test candidates' understanding of two features of a GUI that could be utilized to capture the age of an applicant.

Suggested Response:

- Drop down menu- user selects age from a list of ages [1 mark]
- text boxes- user types in age [1mark]
- user select an item from a list of options with age range [1 mark]

Candidate Responses:

Majority of the candidates stated pointers, menus, windows and icons. A few candidates stated birth certificate as well as birth date and applicant name.

- ii. This section tested candidates' ability to state advantages of the features of GUI.

Suggested Response:

Advantages

- Text box: Faster, user can easily type in name as a opposed to selecting from a lengthy list.
- Drop down menu: prevents users from entering an age hence minimizes the opportunity for errors.
- User select an item from a list of options with age range: prevents users from entering an age hence minimizes the opportunity for errors.

Candidate Responses:

Candidates could not adequately state the advantages of the features since most candidates could only state these features were easier but could not further explain how they improved the interface.

iii. This section tested candidates' ability to state the disadvantages of placing help information on a user interface.

Suggested Response:Disadvantages:

- Distraction to user
- Causes interface to become slower,
- Causes interface to become over-crowded and important information overshadowed

Candidate Responses:

Most candidates did not provide the correct response for this question.

Some responses were:

- May make the person lazy
- May cause people to become frustrated or confused

In Part (c) - this section sought to test candidates' ability to outline three characteristics of users of a system.

Suggested Responses:

- General education level of users -can the vendors read? If they cannot read it would be better to use pictures.
- Language of users- if vendors can read but do not understand English very well than consider using local language.
- Cultural skill level of user – choice of colours, pictures, symbols and so on, may have particular sacred meanings to a group of people. Use them carefully.
- Computer skill level of user on input and output devices – if the vendors cannot type on a keyboard, then use voice input and sound output.

Candidate Responses:

Candidates misinterpreted and were giving characteristics of the **user interface** and not the user. Some of those who got it correct were simply stating and not outlining.

Recommendations to the Teachers

- Students must become familiar with different types of HCIs AND must be able to identify the contexts in which each is most applicable.
- Students must be able to compare different types of HCIs.
- Teachers must focus on all aspects of this module.

Question 6

This question was designed to assess their knowledge and understanding of internet standards and protocols. It also tested students understanding of the World Wide Web (WWW). . Most candidates performed below the acceptable level. A few candidates scored high marks. Four per cent of the candidates, who attempted the question, failed to score any mark.

Part (a) Candidate were able to provide correct acronyms for the given terms.

Part (b) Many of the candidates attempted this question. Most were aware that IP address was a number but did not specify that it is a unique number used to identify computers on a network. Most candidates referred to domain name as the name of the computer but failed to mention that it is a name used to identify a resource on the internet instead of an an IP address or several ip addresses The candidates who satisfactorily stated the difference were able to give correct reasons. Candidates generally could not provide accurate examples of Domain Names and IP Addresses.

Part (c) This question required candidates to define common WWW terms. This question was fairly well done as most candidates were able to define the three terms, However, many candidates struggled to provide an accurate description of the relationship among these terms.

Recommendations to the Teachers

- Students must be able to correctly identify and describe with examples commonly used internet concepts.
- Students must develop a clear understanding of the World Wide Web and its components.

Section III - Information and Problem SolvingQuestion 7

This question was designed to test the student's knowledge of problem solving process, information sources and the role of information in problem solving. Most candidates performed at an acceptable level. A few candidates scored high marks. Three percent of the candidates, who attempted the question, scored zero.

Part (a)(i) Approximately 60 % of the candidates gained 0-1 marks for this question. Most candidates were unable to explain clearly the reasons to be taken into consideration when selecting the most optimal solution. Candidates gave general responses such as “select the one that works best”. They were unable to explain what factors should be taken into consideration to select the most optimal solution.

In many instances candidates spoke specifically about the problem and not about the solution. Many were unaware that all solutions identified are capable of solving the problem and that they are selecting the best solution from these. They need to be more specific.

Part (a)(ii)

Total marks approximately 70 % of the candidates earned 0-1 mark for the question. For the most part these candidates were referring to the problem and not the solution. Some candidates made mention of collecting data about the problem using questionnaires, interview, etc. Candidates’ responses reflected that they were unaware that they are reviewing the optimal solution.

Part (b)

Approximately 50% of the candidates earned full marks for the question.

Part (c)

Approximately 60% of the candidates scored a total of 0-3 marks. Candidates at times gave the wrong explanation for terms listed. There were many cases where the description of accuracy was given for reliability

Part (d) (i) Most students were able to identify examples of extraneous information.

However, approximately 50% of the candidates were unable to identify desirable from the scenario given. Many candidates were unable to explicitly state where the extraneous and desirable information began and ended. At times candidates’ responses included information in more than one category. E.g. for extraneous information the candidates gave “Damian Shaw who lives at 11 Arbor Lane, Roseau.” This response included both extraneous and essential information.

Part (d)(ii) Approximately 65% of candidates’ gained full marks for this question.

Some candidates gave characteristics of information sources as their responses. There were also cases where the categories of information given in 7(d) (i) were given as the other categories.

Recommendations to the Teachers

- Candidates should be given activities such as case studies where they will be encouraged to successfully differentiate among the various categories of information. Case studies can be related to conflicts or issues that exist in their school or community.
- Candidates should be given activities that will allow them to differentiate between terms such as “state”, “describe”, “explain”, “outline”, “identify”, etc.

Question 8

The question assessed candidates' ability to develop a context level data flow diagrams based on a list of tasks to be done. This question also asked candidates to identify information that can be useful to help solve a particular problem – farmer improve productivity. Most candidates performed below the acceptable level. A number of candidates scored very high or full marks. Four per cent of the candidates, who attempted the question, failed to score any mark.

In part (a)(i) - Approximately 80% of the candidates were able to provide the definition of a DFD for either an organization or system

Part (a)(ii) About fifty per cent of the candidates receive full marks.

Part (b) (i) Approximately, seventy five per cent of the candidates were awarded maximum mark for this part of the question.

Part (b)(ii) Seventy five per cent of the candidates received full marks for this part of the question that had identified the source. Most of the candidates who did not identify the first part of the question correctly did not identify the source. Some candidates provided appropriate responses for the sources, many failed to give an explanation.

Part (b)(iii) Some candidates provided basic appropriate responses for ways in which access to the Internet can support farmers in improving productivity but failed to give detailed explanation. Approximately seventy-five per cent received full marks for the question.

Recommendations to the teachers

- Provide students many practice questions related to real life scenarios. These could include role play for the various sectors and how information technology could be used within the sector and how information technology affects each sector.
- Students should be allowed to identify information sources to solve problems in various scenarios.

Question 9

The question was designed to test candidates' knowledge and understanding of the role of algorithms (flowcharts) and programming paradigms/languages in solving real-life problems. Most candidates performed poorly. A few candidates scored very high marks Nine per cent of the candidates, who attempted the question, failed to score any mark.

Part (a)

Many candidates seem to struggle with the concept of **Functional** and **Object Oriented** paradigm. Overall the question was answered poorly. In some cases candidates confused language generation and paradigm. Some candidates identified examples of these paradigm to be language generations, flowcharts, pseudocode and algorithms

Part (b) (i)

Many students had problems answering this question. Many candidates were able to say a loop repeats...the problem was what it repeats, even though the question assisted the students with the words “block of program code”. Some candidates answered this question with the use of an example...pseudocode.

Part (b)(ii)

Many candidates were able to identify that it was a condition but did not connect the condition with a looping structure.

Part(b)(iii)

Candidates found it challenging to answer this question. They confused documenting with the actual source code.

Part (c)

Fairly done, many candidates were able to get 50%, especially the correct values of P. Candidates seem to have challenges with the counter not picking up that N=4. Some understood the iteration (by 1) but not the increment. Others only seem to know the start and end values

Recommendations to the teachers

- Students must be able to identify different stages of the programming process and demonstrate an understanding of the important activities at each stage.
- Ask students to research the various programming paradigms and languages. Ensure that they become aware that some languages span two or more programming paradigms, for example, C++, Prolog, and Python. Also, with the rapid pace of technological developments, new paradigms emerge and therefore students need to become aware of the changes.
- Describe scenarios, extracted from students’ environment, and have them use the various algorithmic forms (flowcharts, narratives and pseudocode) to develop solution. Ensure that these scenarios will require them to utilise the various control constructs. Where possible, they should be allowed to develop program code (using Basic or Pascal) from algorithms so that they can appreciate the benefits of algorithms.
- Provide examples of algorithms with faulty logic and have student identify and correct the errors in them. The students should be asked to give valid arguments for the errors identified.
- Programming and problem solving should be taught early. Students should be allowed enough time to solve problems, learn concepts, write programs, etc.

Paper 03/1 – Internal Assessment

This project enabled students to demonstrate their skills and competence in using IT tools to assist them in developing a solution to a problem.

Students, with guidance from their teacher/tutor/supervisor, should be encouraged to identify a problem in their environment. While the majority of projects were concerned with solving problems involving data storage and retrieval, the majority of those moderated were concerned with computerising the school's library system or the book rental procedure

Critical weaknesses were seen in the ability of students to

- Define the problem they were solving.
- Analyse the data collected to establish the (major) cause of the problem being investigated.
- Identify two (complete) IT based solutions.
- Evaluate the identified solutions
- Justify the choice of solution by looking at the treatment of issues that could arise from the implementation of the solution.
- Present a well written report complete with cover page, an abstract, the table of contents (and page numbers) and a list of sources all conforming to MLA or APA document styles.

The following sections highlight the most glaring weaknesses seen in the reports moderated and offer recommendations that may be used to address those weaknesses.

Problem Definition

There has been a marked decrease in the quality of the problem definition statements over the previous year. Students who scored poorly lacked clarity in how they presented the problem statement. Many students:

- highlighted multiple problems and therefore were unable to define the scope of their solution,
- excluded the background to the problem and as a result had no context in which the problem existed
- stated the causes of the problem in this section, instead of the effects the problem had on the organization or individuals.

A small number of students incorrectly included solutions in this section of the report.

Recommendations

Students should include a background to the environment in which the perceived problem exists. This background can briefly describe the day to day procedures (in the case of a commercial enterprise). The problem statement that follows should therefore be as succinct as possible (2 to 3 lines long), identifying the person or organisation affected, the reason for the concern and the result of the effect of this concern.

- Refer to New Perspectives on Computer Concepts by Parson and Oja (Programming Basics chapter) for more guidance on the problem definition.

Gantt Chart

Most students scored full marks for this section. These students were able to produce a Gantt chart which included all stages of the problem solving process (and any sub-stages) from Analysis of the Problem to Justification of the Solution. Although a table design showing successor and predecessor tasks may be useful; candidates were solely awarded marks for representation of the tasks with the use of the Gantt chart.

Students who scored poorly:

- Had timelines that were unrealistic e.g. it is very unlikely that the three data collection methods can be employed and analysed in less than a week.
- Used a table format instead of a chart and
- Excluded important tasks. Some students incorporated Implementation and Review sections, which are not a part of the requirements for the project.

Recommendations

Candidates should be encouraged to:

- create Gantt charts that provided a true reflection of the life of the project. It may include the documentation stage that deals with the actual printing, compilation and binding of the project.
- produce charts that have:
 - A meaningful heading
 - Axes are appropriately labelled and scaled. If symbols are used a legend should be incorporated.

Analysis of the problem

The majority of students were unable to score full marks for this section for one or several of the following reasons:

- Some students described the problem in detail, but no causes of the (major) problem were established.
- It was seen that of the three (3) fact finding tools used, not all pointed to the causes of the (major) problem.
- Some students listed advantages and disadvantages of using the tool or gave a definition/description of the tool.
- The questions chosen for the interviews and questionnaires were not always relevant to the IA and very often added no value to the analysis.
- Some students did not interpret the findings obtained from the fact finding tools and as a result the causes of the (major) problem were not sufficiently established.

Candidates that received full marks showed the causes that led to the effects that the person or organization was experiencing with appropriate use and analysis of three (3) fact finding techniques.

Recommendations

Students should use fact finding tools that are suitable to their project. Questionnaires, interviews and observations are good tools but students should be aware of other tools that can aid in their analysis. Examples of other fact finding tools are

- review of documentation
- surveys
- focus groups and
- experiments.

For those students that have chosen to utilise observation as a fact finding tool, it should be noted that observations cannot be properly done in one visit; a good observation should be carried out over several visits to the entity, at different times of the day and be well documented. An effective observation must indicate the date, time and length of the observation and why those time frames were selected.

Identification of Possible Solutions

Most candidates did fairly well in this section. Students who scored partial points choose solutions of similar nature without explanation of the differences, for example, many students suggested a DBMS and a Spreadsheet as their solutions; without further explanation or description, these are considered to be one software solution. Some candidates chose solutions that only solved specific parts of a problem and not the problem in its entirety. A number of candidates identified non-IT based solutions which were not awarded marks. Flow charts, pseudo-code and data flow diagrams by themselves are not suitable solutions.

Recommendations

Ideally this section should include:

- level of automation
- processing methodology
- network technology (if any)
- software alternatives and
- hardware alternatives.

Solutions identified should be relevant and realistic to the problem and describe a complete IT based system, for example a barcode reader is a hardware component of a point-of-sale system, and therefore, cannot be accepted as a solution.

Evaluation of the Possible Solutions

This component required that students objectively evaluate two or more identified solutions. Students who scored poorly did not identify appropriate elements such as hardware, software, other equipment, cost, personnel, training, reliability, time for development and implementation, environmental effects, security and maintenance. They also included a comparison of the solutions which is not appropriate for this section. Students also presented a table showing weighted elements but failed to elaborate on the elements, partial marks were allotted to these students. Some students presented only pictures of the hardware components

of their identified solutions, which was inadequate.

Recommendation

- Students can utilize a feasibility study to perform the evaluation. A feasibility study includes economic, social, political, technical, operational and schedule feasibility. These sections cover all the necessary elements mentioned before.
- Advantages and disadvantages can be added to enhance the evaluation.
- Refer to New Perspectives on Computer Concepts by Parson and Oja (Information Systems Analysis and Design chapter – Section B: Systems Analysis) for an example of an evaluation table.

Selection of Solution

Students were awarded full marks in this section if they had identified two IT based solutions and were therefore able to choose one.

Partial marks were awarded if only one solution was identified or if two software solutions were identified without explanation (see **Identification of Solution** section above).

Justification of the Solution

This component required students to thoroughly analyse the issues related to the implementation of the chosen solution, propose strategies for dealing with the issues, and provide an appropriate justification for all the strategies recommended. Many students performed poorly in this section. Many students repeated information from the evaluation section as justification.

Some students discussed strengths of the solution instead of the issues that may arise from its implementation.

Recommendations

- Students can employ the method of SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis to justify the solution chosen.
- Students should also defend the chosen solution over the other solutions identified if the other solution(s) appeared to be a better choice, for example, solution B is chosen over solution A although it costs more to be implemented.

Presentation and Communication of Information

This section required students to present their report in a format and style to meet minimum standards of papers for academic purposes. While not included in the criteria being tested, it is expected that students will communicate their findings using correct grammar and utilising the spell check feature found in most word processors. Many students did poorly in this section for a number of reasons.

- They did not present an abstract or the abstract was inappropriate.

- References were either missing or not in a proper MLA or APA format.
- Some students had table of contents but page numbers were missing or page numbers were present but the table of contents was missing.
- Some students presented a table of contents but the page numbers did not correspond to the document.

Recommendations

- If questionnaires, interview questions and charts are placed in the appendix they should be referenced in the body of the document.
- The abstract should only give an overview of the requirements of the project and not a description of the solution.
- The project should reflect in its entirety MLA or APA formats. These formats speak to:
 - font style and size throughout the document,
 - font size and formatting for headings,
 - page margins,
 - line spacing,
 - justification of the document and
 - presentation of sources used.

Paper 03/2A –Alternate Paper to SBA

Candidates were required to demonstrate their knowledge and understanding of the problem solving process. The responses of all candidates were poor, showing a lack of clear understanding of the problem-solving process and what is to be accomplished at each stage of the process. Of the seven candidates who wrote this exam, none scored more than 15/60.

UNIT 2

Paper 01 – Multiple Choice

The paper was comprised of 45 items, with 15 items per module.

Most candidates performed satisfactorily. Correct responses from candidates on this paper range from 9 to 42. Most candidates performed satisfactorily. The mean score on the paper was 60.97 (out of 90).

Paper 02 – Structured Questions

The paper consists of nine compulsory questions: 3 questions per modules. The maximum score was 102 out of 150. The mean score on the paper was 54.38, compared to 52.74 in 2011.

Section I – Information Management

Question 1

Candidates were assessed on their knowledge and understanding of data management procedures. This question was poorly done by most candidates, suggesting that the concepts were not covered in-depth. Ten per cent of the candidates who attempted the question scored zero-two marks.

In Part (a), students were asked to explain TWO ways in which ‘Data Storage’ and Data retrieval has changed over the last 15 years. This question was poorly done by most students due to the fact that they are not aware of the timeline of technology. As a result candidates were not able to efficiently explain ways in which data storage and retrieval has changed over the last 15 years. For example candidates make reference to how cave men use to store and retrieve data.

In part (b), the candidates were required to apply their knowledge and understanding of flat file database systems. A large number of students did not know what a flat file is. Most candidates referred to a flat file as a paper document stored in a folder in a filing cabinet. Hence, the disadvantages being given referred to data retrieval from filing cabinets as opposed to disadvantages associated with a flat file two dimensional table. For example, candidates would mention “data redundancy” but make reference to duplication of data by multiple departments storing the same information separately in their own filing cabinets.

In part (c), students were expected to provide definition of basic data management terms. Most candidates lacked accuracy in their definitions. Field, Record and Cardinality are basic jargons of information technology. One expected that candidates would be able to be precise in their definitions.

Recommendations to the Teachers

- Encourage students to develop an IT dictionary of popular terms and concepts to aid them in learning definitions of IT words;
- Teachers should work with students to develop a better understanding of the history and emergence of technologies, especially in cases where older technologies are replaced by newer, improved alternatives.

Question 2

The question was primarily designed to assess candidates ‘understanding of the data needs of organisations and how to design SQL statements to extract data from a database. . Most candidates struggled with the SQL part of the question resulting in a very high percentage of low scores. . A few candidates scored very high marks. One per cent of the candidates failed to score any marks.

Part (a) Students did not understand how to relate the definitions of data timeliness and data accuracy to a specific scenario. Students were giving definitions of the terms rather than

explaining how the absence of each would affect the airport's business.

Part (b) required students to write SQL statements. 95% of all students did not write SQL statements. Students were explaining what needed to be done or they were giving a representation of a MS Access Database.

Recommendations to the Teachers

- Students **MUST** be able to write actual SQL statements. Teachers should set up exercises for students to practice the writing and execution of SQL.
- Students must be able to relate specific concepts to particular scenarios e.g. data timeliness and data accuracy issues in the context of an airport operation. Teachers must take students to a higher level of understanding of these concepts and not limit students to just knowing what these concepts are.

Question 3

This question assessed candidates' ability to distinguish key terms in the Database Management System; justify recommendations for normalising a table; apply normalization rules to a table up to the third normal form, remove normal form violations; design tables from an un-normalised table and state the benefits.

In Part (a), candidates were required to distinguish between a form and a report. Overall, candidates were not able to distinguish between the two. They saw a form as being created by a database rather than 'a means of collecting user data, and also for viewing or editing existing records' and reports were identified as 'being used for retrieving data (often the results of a query) from a database'. Good responses were received from candidates. Candidates were also asked to distinguish between a primary key and a foreign key. Most candidates stated that a primary key is a unique identifier of a table rather than of a record. However, most of them were able to correctly give the definition of a foreign key.

In Part (b) (i), an appropriate stimulus was provided in the form of a table, candidates lacked the depth expected in their responses. Most candidates were not able to provide the features of the table given that justify recommendation of normalization. Most candidates stated that data was redundant and there was duplication of data which meant the same thing. They gave general responses why the table must be normalised.

In Part (b) (ii), candidates were generally able to provide the responses expected. Candidates who were able to correctly generate the tables performed well on this question. Most students receive full marks for identification of the Customer table but the Orders and Product tables were not properly constructed. They received the mark only for identifying the table but were not able to place correct fields in the table.

In Part (b) (iii) (a) Candidates were asked to explain what is meant by the term ‘3NF’, highlighting the benefit it brings to a database. Most candidates failed to define the 3NF and ignored the benefits of having a table in 3NF.

In part (b) (iii) (b) A significant number of candidates were unable to identify the correct response for converting the database from 2NF to 3NF. Most candidate stated general rules for changing a table from 2NF to 3NF such as ‘remove transitive dependencies or non-key dependencies.’ Their responses were not specific to the database given; the expected answer was ‘remove the total column from the order table’.

Recommendations for Teachers

- Ensure that students are able to differentiate between the different terms in a DBMS
- Normalisation need to be taught in its entirety not just learning definitions associated with the topic. They should be able to distinguish between the different forms of normalisation rules in developing different tables and benefits of each form not just that “it will eliminate redundancy”
- Explain and illustrate how to move from an un-normalised table to tables in 3NF.
- Use a variety of practical examples and exercises to ensure that students become familiar with normalisation of tables. Students would then better appreciate the differences between normalized and un-normalized data.

Section II – Use of Information Technology Tools

Question 4

The question sought to examine the candidates’ knowledge and understanding of the features and functions of presentation software tools. The performance of candidates was below the acceptable level. 3.5 percent of the candidates, who attempted the question, failed to score any mark.

Part (a) This segment of the question tested candidates’ overall knowledge of a word processing software and its features

- i. This section tested candidates’ ability to identify security features specific to word processing software

Suggested Response:

- Password protection feature. Set password for the document which will make the document inaccessible to persons without the password you set.

Candidate Responses:

Candidates generally stated the feature of the word processor but were unable to explain further. Some candidates also stated encryption was the feature. Additionally, several candidates stated that the file could be saved on an external device which suggests the question was not properly read.

ii. This section tested candidates' knowledge of the mail merge feature

Suggested Response:

- Use the mail merge feature: select the fields needed from the database and insert them at the appropriate place in the main document. This allows for copies of the letter to be created for each member of the database, when the merge is complete.

Candidate Responses:

- Some candidates were unable to name the feature but could describe what it did. A few candidates suggested the creation of a mailing list from a mailing agent.
- This section tested the candidates' knowledge of the find and replace feature of a word processing software.

Suggested Response:

- Find and replace feature: this will allow you to enter a word or phrase to be found and specify another word or phrase to replace it through out the document.

- Candidate Responses:

Candidates suggested that cut and paste was the feature that could be used and those who mentioned the correct response were unable to explain and thus could not secure full marks

Part (b)

- iv. This question sought to test candidates' ability to compare spreadsheet and database software and state distinguishing features of the spreadsheet software for statistical use.

Suggested Response:

- Graphing tool- this allows statistical data to be represented graphically choosing from several types of graph options such as bar, pie or line graph.
- Statistical functions- this allows for easy summary of statistical data utilizing common statistical functions such as sum, average, minimum, maximum.
- What if analysis –which can be used to assess how certain changes in data would affect other data and thus results of statistical analysis.

Candidate Responses:

Generally, candidates mentioned the graphing tool but were unable to state any other suitable features. Few candidates provided explanations and examples, hence were unable to secure full marks. Also, many candidates stated calculations as a key difference between the two software programs, however this could be done by both software tools. Only a few candidates stated the what-if analysis feature.

Part (c)

- This section sought to test candidates' knowledge of desktop publishing software and its usage in creating newsletter publications.

Suggested Responses:

- The most appropriate type of software is desktop publishing: such software enables the user to create sophisticated documents that contain text, graphics and many colours using available professional quality templates.

Candidate Responses:

- Most candidates suggested the word processing software as the most appropriate software and could only state the ability to use graphics and texts. For those candidates who stated Desktop Publishing Software they were unable to score full marks because they did not mention the ability of the software to produce a professional quality template which makes it easier to create newsletters.

Recommendations to the Teachers

- Teachers must spend more time discussing the use of these tools with students. In particular, discuss cases where multiple tools can be used for the same task. In cases where multiples tools can be used for same task, students must be able to identify most appropriate tool.

Question 5

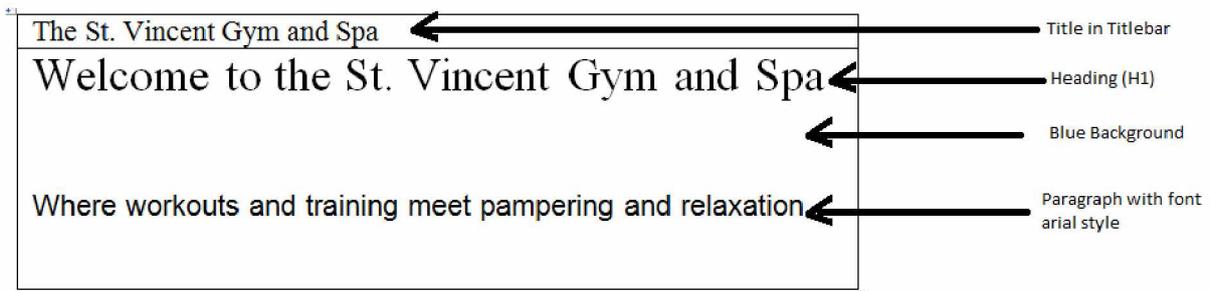
This question was designed to examine the candidates' knowledge and understanding of Hypertext Mark-Up Language (HTML) and Web Page Design using Web Authoring Software tools. Most candidates performed satisfactorily. A few candidates scored full or very high marks. Three percent of the candidates, who attempted the question, failed to score any mark.

Part (a) candidates were expected to observe the HTML code given and then draw and label the diagrammatic representation. Of all the candidates who attempted this part, most only students received half of the marks. Candidates lost marks because of:

- Just drawing the diagram and not labeling
- Not differentiating between font color and background; student mistakenly thought that the font color should have been blue

- Recreating the HTML codes given

Candidates were expected to create a diagram similar to the one below



Part (b) - Candidates were required to update the given HTML code to create a table with the various items and their corresponding prices. This part of the question was poorly done. Majority of the Candidates scored two (2) of the five (5) marks for this part. The majority of the candidates received the mark for identifying the table rows (TR) and table data (TD); However marks were lost because of:

- have no knowledge of html codes and hence wrote nothing
- leaving off the table tag
- syntax errors

The two expected responses should have been

<pre> <table border = 1> <tr> <td>Item </td> <td>Price </td> </tr> <tr> <td> Regular Member</td> <td>\$ 900 </td> </tr> <tr> <td> Gold Member </td> <td> \$ 1000</td> </tr> <tr> <td>Platinum Member </td> <td> \$ 1200</td> </tr> </table> </pre>	<pre> <table border = 1> <tr> <th> Item </th> <th> Price </th> </tr> <tr> <td> Regular Member</td> <td> \$ 900 </td> </tr> <tr> <td> Gold Member </td> <td> \$ 1000</td> </tr> <tr> <td> Platinum Member </td> <td> \$ 1200</td> </tr> </table> </pre>
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A few Candidates responses were of the two formats above

Part (c), candidates were required to outline an alternative method than writing HTML codes for developing web pages.

This part of the question was better done; however most received only one (1) of the two (2) marks.

Candidates lost marks because of:

- giving incorrect responses like Pascal, XML, DHTML, Notepad

- just stating that a web authoring software can be used but not outlining how it can be used

One suggested response should have been

- ***Web pages may also be developed using WYSIWYG (What You See Is What You Get) web developing software tools such as front page. The user is expected to design the page graphically and the software automatically creates the HTML codes.***

Two Responses from candidates are typed out below

- *An alternative method to writing HTML code is web authoring tool or software, for eg dream weaver. The user designs the website but not create or write the html code.*
- *Use of software that allows a graphical user interface for web page development eg. Dream weaver allows the drawing of tables for webpages instead of html.*

Part (d)

candidates were required to differentiate between a blog and a wiki. In most instances, candidate were only able to score two (2) out of the four (4) marks.

Candidates lost marks because of:

- Identify that they are websites but not clearly stating the difference between the two
- Only stating the definition of the two
- Not having knowledge of what wikis and blogs were

Expected responses from candidates should have been

A blog is an informal website consisting of time-stamped articles or comments much like a journal. The blog is usually authored by one person and comments can be added by visitors or guests.

A wiki is also a collaborative website but it allows users to add, modify or delete the content via their web browser even if they were not the original author.

Three responses from candidates are typed out below

- ✓ *A blog is a list of journal entries posted on a web page; however wiki is a web site that allows users to add or update the contents of the site using their own knowledge.*
- ✓ *Blogs and wiki are both types of websites. However they are different. Blogs or web logs enable users to only add information or comment on it over a period of time. It does not facilitate for editing of what was already posted; you are only allow to comment. Wikis however allow users to access and edit the actual information which then has the other implication such as false data being input. Blogs only allow addition of comments, while wiki allow you to change the information they possess.*
- ✓ *A blog is a type of webpage that derives from web log. It is an online diary. It is not like a physical diary that is private. The user post his or her information on the blog*

for viewers to see and have their ideas while a wiki is a webpage that provides information to users and anyone can edit the information on the websites unless protected.

Recommendations to the Teachers

- Teachers should focus more on students learning of HTML and web page design. Students should be asked to design web pages by writing HTML.
- Students should develop an inventory of the different types of websites and be able to distinguish among them. Also they should be able to identify similarities.

Question 6

The question sought to examine the candidates' knowledge and understanding of a variety of Software tools and apply them to various situations presented. They also need to develop an awareness of emerging technologies. Most candidates performed satisfactorily. A few candidates scored very high marks.

Part (a) (i) Many candidates knew the benefits of using information technology as it applied to the case presented; however, some were not able to express themselves properly and lost marks accordingly.

Part (1)(ii) This question was well done, as most candidates could correctly identify the most appropriate IT technology application in the scenarios given.

Part (b)

This question speaks to the criteria used to assess the appropriateness of an information source. Candidate did not answer this question satisfactorily as they mixed up the reasons for the use of the IT tools with that of the sources.

Part (c)

Most candidates satisfactorily answered this question while some candidates did not know what each letter in the acronym VOIP stood for. They were able however to state the advantages and disadvantages.

Part (d)

The candidates were aware of emerging technology but many did not differentiate between appliances in the home and general appliances and this is where they lost valuable marks.

Recommendations to Teachers

- Candidates should develop an inventory of emerging technologies and identify the key features of these technologies.

Section III – Social, Organisation and Personal Issues

Question 7

Ninety-nine per cent of the candidates attempted this question. The question assessed candidates' knowledge and understanding of various computer crimes.. Several candidates scored very high. However, several candidates score zero marks on this question.

In part (a), Approximately 70 % of the candidates were able to define software piracy accurately. However, many candidates struggled to define spoofing and spamming accurately. Several candidates gave the definition of pharming for spoofing. There were many cases where candidates when defining software piracy referred to software as data, material, piece of work etc. Many candidates indicated that spamming was junk mail, advertisements, message etc.

In Part (b) majority of the candidates did not explain clearly what identity theft and computer addiction is. Many candidates were unable to explain how one can be affected by identity theft and computer addiction. On many occasions, candidates were unable to explain clearly how they can minimize identity theft and computer addiction.

In many instances, candidates indicated that identity theft was the stealing of one's identity or stealing of one's personal information. Candidates' responses showed that they were unaware that identity theft involves using a person's information to impersonate them. In terms of computer addiction candidates stated that this is when an individual becomes addicted to a computer or spend many hours around the computer. It was also observed that many candidates gave responses such as "stop shopping on the internet" as a measure to minimize identity theft.

In Part (c), The responses given for this question were poor for the most part. Approximately 50% of the candidates were able to distinguish between cracking and hacking. About 30% of the candidates were able to distinguish between adware and spyware, and phishing and pharming.

There were many cases where candidates defined cracking as hacking or vice versa. For pharming and phishing some candidates' responses were incomplete or included responses for spoofing and spamming. In most cases candidates did not distinguish between the terms given but gave definitions instead.

Recommendations to the Teachers

- Candidates should be thoroughly introduced to the various computer crimes as stipulated by the CAPE IT syllabus.

- Students should be asked to keep a running inventory of computer crimes and keep up to date with this issue.

Question 8

This question examined candidates' knowledge and understanding of the risks to IT systems associated with natural disasters. About seventy percent of the candidates received full marks for the question. Some candidates misinterpreted the question and identified different types of natural disasters and examined students understanding of how organisations manage old hardware. Most candidates performed at an acceptable level. A few candidates scored very high marks.

Part (a)(i)

This question tested the candidates' ability to state the risks to IT systems associated with natural disasters found in Module 3.5. About seventy percent of the candidates received full marks for the question. Some candidates misinterpreted the question and identified different types of natural disasters.

Part (a)(ii)

This question tested the candidates ability to explain the mitigation strategies to reduce the risk to IT systems associated with natural disasters. Approximately, fifty percent of the candidates received full marks for the question.

Part (b)(i)

This question tested the candidates ability to state environmental risks associated with the disposal of obsolete computer equipment and other hardware. About eighty- percent of the candidates receive full marks for this question. The marks allocated were adequate for this question.

Part (b)(ii)

This question tested the candidates' ability to examine various other computer security, health and safety and environmental risk and threats. About eighty- percent of the candidates receive full marks for this question.

Recommendations to the Teachers

- Encourage students to read the content in the syllabus for the objectives.
- Provide students with real life activities so students can identify various environmental risks and threats in different situations.

Question 9

The objectives tested candidates' knowledge and understanding health and security issues associated with the use of computers and safeguarding information assets of an organisation. Most candidates performed below the acceptable level.. A few candidates scored very high marks while a few candidates failed to score any marks.

In part (a)(i), Not many candidates received full marks for this question. Most candidates were able to identify blood circulation as a potential health problem. Many did not understand or misinterpret the term **effects on the health**.

In part (a)(ii), Most candidates were able to identify the correct ailment. A number of candidates however, were not able to fully describe the ailment identified. Candidates seemed more focused on which part of the body would hurt rather than the effect on health.

In part (b)(i), **Candidates seem to have interpret 'Explain' for 'Define'...because definition was given instead of explaining how the malware affects the computer.** Most candidates obtained 50% or more for this question. Many candidates however referred to anti-virus as **virus protector** or **virus protection**.

In part (b)(ii), very few candidates were able to explain how Trojans affect the computer system. A lot of candidates gave the definition for each malware instead of looking at how it affects the computer. Many candidates were able to identify antivirus as one of the preventive measures.

In Part (b)(iii), many candidates used the term 'eats' when referring to the act of the virus being alive and eating up space as opposed to using up space in memory. Many candidates still have not been able to distinguish between the three malware

In part (c)(i), Some candidates gave responses on how to protect assets, rather than giving the assets themselves. However about 70% of the candidates were able to identify customer personal information and Account information

Part C (ii)

Candidates failed to state the actual policy, they simply explained it. As a result most candidates did not get full marks.

Part C (iii) Candidates did not recognize the term other. Many of the responses were very limited, in that 90% of the candidates mentioned password and encryption as two other methods.

Recommendations to the Teachers

- Teachers should spend time discussing with students the identification and meaning of key terms in questions.

Paper 03B – School Based Assessment (SBA)

This project enabled students to demonstrate their skills and competence in using IT tools to identify and develop a solution to a problem.

The structure of the two year course is such that students can identify a solution in the first

year (Unit 1) and continue to develop that solution in the second year (Unit 2). Students may, however, choose to solve a new problem in the second year without penalty.

The SBA is divided into two sections.

1. The Report - identifies the problem, gives the analysis of research carried out in relation to the problem and lists the tools used to develop the solution.
2. The Solution – the design and development of an application that when implemented can solve the problem identified in the Report section

While the majority of students choose to implement a Database for their solution, some chose to implement a webpage. A very small group of students implemented a web-based solution with a database as the back end.

One major shortcoming found in the presentation of solutions was that students did not provide enough evidence of the development of their solutions. Students should be encouraged to submit screenshots of all aspects of their projects. This problem was compounded when there was no softcopy of the project. At moderation, marks cannot be awarded or supported if there is no evidence of the development or a working solution.

REPORT

Problem definition

The majority of students were unable to score full marks in this section and for the same reasons as found in the Unit 1 SBA. While some students may have carried over their research from Unit 1, it is evident that they also brought over the weaknesses. Problems were not clearly defined and there was no background information to place the problem in context. Also, many students described many problems in this section, thereby expanding the scope of their solution.

Recommendations

Students should be encouraged to:

- Describe the effects and nature of the problem and who it affects, in the background.
- Give a clear description of a single problem.
- Solutions are not to be included in this section
- State a current problem instead of a problem that could happen.

Analysis of the problem

The majority of students were unable to score full marks in this section because they were unable to interpret the results from the fact finding tools; some discussed irrelevant findings and many of them gave descriptions of the tools used.

Recommendations

The role of the teacher/tutor/supervisor remains critical in this section of the project. Students should be guided in designing their questionnaires and interview questions and any other tool being used to gather information. The use of open ended questions should be kept to a minimum on questionnaires. The analysis of this data MUST point to the major cause of the problem.

Identification and Justification of IT tools used in the Solution

This section asked the students to identify and justify the use of productivity tools that were used to complete their project; however, it goes beyond identifying the word processor as “the productivity tool to create text based documents”. Students are asked to specifically identify those tools and features of the tools used in their solution. Identification of only one tool gained partial marks. There was no reward for the identification of hardware or networking tools.

Recommendations

- The IA requires the use of more than one productivity tool.
- Students should identify the productivity tools and explain how and why they used specific features of that tool to develop their solution to the problem identified.

Assessment of the implications of the solution

The majority of students were able to identify issues involved in the implication of the solution. However, many of them failed to thoroughly discuss all the issues or suggest strategies to address the issues.

Some students discussed strengths or benefits of the proposed solution. This was not a requirement of this section of the IA.

A few students discussed issues that were not relevant to the proposed solution.

Recommendations

Students should be encouraged to tie issues relevant to their proposed solution to the objectives found in module 3 of the Unit 2 Syllabus. While the list of issues may appear quite long, students should limit their discussions to at least two issues applicable to their proposed solution.

SOLUTION – Implementation of the solution

Appropriate Use of IT tools and their features

The majority of students were able to show appropriate use of the IT tools and the features of those tools.

Some students were unable to gain any marks under this section because there was no evidence, in hard or softcopy, of their work.

Recommendations

All stages of the development of the project should be submitted for moderation.

- For the database solution:
 - Normalisation of the tables, table design, relationships, query design, SQL etc.
 - Screen shots would suffice for most of these.
- For the webpage solution:
 - Layout or web of the pages showing how the pages are linked together, this may be a sketch.
 - HTM code for each page (minimum of 3).

Human Computer Interface

The majority of students displayed limited use of the navigational features (buttons linking to pages, next, previous, home and exit buttons on each page).

While most students were able to create a switchboard for their database application, many of the switchboards had limited navigation, and in most cases, it was impossible to return to the switchboard because there was no active 'menu' button to achieve this. All buttons were labelled.

Recommendations

- Students should be encouraged, as part of the user-friendliness of the solution, to include the above mentioned buttons on each page of their solution.
- All buttons must be appropriately labelled in font size, style and color.

Working solution

The majority of students demonstrated their ability to create a functional database application or webpage, however, all applications or webpages did not effectively solve the problem identified in the problem definition section.

Some solutions were inaccessible because there was either no password to access the application, or the given password was incorrect.

Recommendations

- Students should be encouraged to include screen shots of their solution, especially those screen shots to confirm the design of the solution.
- Students should include a read only file (.pdf would suffice) with the password.
- If candidates should customize their database solution so as to restrict access to the design view (back end), a copy of the administrators version of the database should also be included to facilitate proper assessment.

General recommendations

- It is recommended to place the CD in a plastic case (paper sleeves and jewel cases do not provide appropriate levels of protection to the CD). A mini CD may also be appropriate.
- Please find the amended mark scheme for the IA attached at the end of this report. Teachers should disregard the mark scheme found in the syllabus booklet.

Unit 2 – SBA Mark Scheme

REPORT:

- **Problem Definition** **1 mark**

 - Complete description of the problem 1 mark
(including description of the background in which the problem occurs)

- **Analysis of the problem** **2 marks**

 - Thorough analysis of *facts to identify* the causes of the problem 2 marks
 - Partial analysis of *facts to identify* the causes of the problem 1 mark

- **Identification and Justification of IT Tools used in the solution** **2 marks**

 - Identification and justification of all appropriate tools 2 marks
 - Identification and justification of some of the appropriate tools 1 mark

- **Assessment of the implications of the solution** **3 marks**

 - Discussion of *various* issues that may impact the individual or entity 1 mark
 - Discussion of strategies to address the issues 2 marks
 - *Discussion of ALL strategies to address issues* 2 marks
 - *Discussion of SOME strategies to address issues* 1 mark

SOLUTION:

Implementation of the IT based solution

12 marks

- **Appropriate use of IT tools** 1 mark

 - Appropriate use of ALL tools 1 mark

- **Human Computer Interface** 2 marks

 - Logical and user friendly navigation with appropriate labelling marks 2

- Limited navigation available with appropriate labelling mark 1
- **Appropriate use of features of tools** 2 marks
 - Selection and appropriateness of ALL relevant features marks 2
 - Selection and appropriateness of SOME relevant features mark 1

EITHER

- **Working Solution (Database)** 7 marks
 - Working solution based on a minimum of three (3) entities
 - *Solution includes MOST of the relevant tables* 1 mark
 - *Evidence of appropriate relationships and integrity checks* 1 mark
 - *Security features included* 1 mark
 - *MOST features work (Award 1 mark for SOME features work)* 2 marks
 - *Solution implemented does solve the problem.* 2 marks

OR

- **Working solution (Website – minimum of THREE pages)** 7 marks
 - Home page 2 marks
 - *Possesses MOST standard features (Logo or banner, title, navigational links, etc.)* 2 marks
 - *Possesses SOME standard features* 1 mark
 - Navigational Features marks 2
 - *MOST features / links working* 2 marks
 - *SOME features / links working* 1 mark
 - Design and Layout marks 3
 - *Appropriate use of font sizes and styles* 1 mark
 - *Appropriate use of colours* 1 mark
 - *Appropriate use of spacing (readability)* 1 mark

Paper 03/2B – Alternate Paper to SBA

This paper tested candidates' ability to apply appropriate features of software tools in developing solutions to a problem encountered in their environment (school or community).

Four candidates wrote the exam, none scored over 20/60.

The four candidates were able to score more than 10/20 on question 2. One candidate attempted question 3 but failed to score more than 5/20.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®**

MAY/JUNE 2013

INFORMATION TECHNOLOGY

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GENERAL COMMENTS

This year, approximately 1,070 candidates wrote the Unit 1 examination compared with 960 in 2012. The performance in 2013 was consistent with that of 2012 — 90 per cent of the candidates achieved acceptable grades compared with 91 per cent in 2012. In Unit 2, approximately 560 candidates wrote the examination compared with 610 in 2012. Of these, 90 per cent achieved acceptable grades in 2013 compared with 95 per cent in 2012.

While the performance of candidates on both units was satisfactory, there were questions where performance was below the required standard. These included questions which tested algorithms, programming constructs and problem solving in Unit 1 and in Unit 2, the information technology tools required to solve real-life problems. In addition, candidates continue to interpret terms associated with Information Technology as everyday terms, thereby providing inappropriate responses.

DETAILED COMMENTS

UNIT 1

Paper 01 – Multiple Choice

The paper comprised 45 items, 15 items per module. Most candidates performed satisfactorily. The marks on this paper ranged from 10 to 44. The mean mark for the paper was 66.56 per cent.

Paper 02 – Structured Questions

The paper consisted of nine compulsory questions, three questions per module. The maximum score was 119 out of 150. The mean score on the paper was 32.59 per cent compared with 34.35 in 2012.

Section I: Fundamentals of Information Technology

Question 1

For this question, candidates were expected to demonstrate their understanding of concepts associated with information technology (IT) and the application of IT in various sectors. They were also required to describe the function of programming and databases in IT solutions and distinguish between the terms *qualitative and quantitative* and *sampled and detailed*. The mean mark for this question was 7.13 out of 15.

The majority of candidates answered Part (a) satisfactorily. However, candidates experienced challenges answering Part (b) where they provided definitions of the terms instead of indicating their functions in IT solutions or distinguishing between terms as required in Part (d).

Recommendation to Teachers

Students preparing for the examination should use the glossary provided in the syllabus to become familiar with terms used in constructing questions. This would provide assistance in determining the quality of response expected.

Question 2

This question examined candidates' understanding of the information processing cycle and characteristics of information. The mean mark for this question was 7.28 out of 15.

Generally, candidates were able to correctly answer the parts of the question which required stating the activities in the information cycle and listing the characteristics. However, most candidates could not explain the importance of the characteristics identified to the given situation.

Recommendation to Teachers

Teachers must not only emphasize definitions and functions but students need to be given the opportunity to analyse scenarios which utilize information technology in everyday activities and experiences.

Question 3

This question examined candidates' understanding of the characteristics of computer hardware and software and the application of computer software to business and professional needs. The mean mark for this question was 6.94 out of 20.

Many candidates were unable to identify the trends in hardware development. Candidates also struggled to outline the functionalities of various tools in Part (b). Candidates were generally able to identify appropriate software tools for tasks provided. However, some candidates were not clear on the specific use of the tools.

Recommendations to Teachers

Teachers are encouraged to use real-life business scenarios when teaching the application of software tools to business. Teachers should also compile a glossary of hardware items, outlining their definitions and functions.

Section II: Information Technology Systems

Question 4

This question assessed candidates' knowledge and understanding of information technology systems including components of the IT system and the role of users. The mean mark for this question was 5.82 out of 15.

In Part (a), most candidates were able to identify the three components of an information technology system. However, a few candidates listed input and output devices instead. In

Part (b), most candidates were unable to state the role of the user and only a small percentage of candidates received full marks for this question.

In Part (c), most candidates were unable to adequately describe the function of the information technology systems. In Part (d), instead of explaining the importance of categories of users, candidates gave responses which related to the roles and functions of each level of user.

Recommendations to Teachers

Students must be encouraged to read all questions thoroughly, paying special attention to key words and phrases in an effort to understand the requirements of the question. Teachers should use authentic examples which highlight the importance of maintaining different levels of users and access to information systems. One such example would be in a commercial bank.

Question 5

This question tested candidates' knowledge of the explanation of terms associated with the security of information technology systems, the adaptation of user interfaces to increase effectiveness and implementation of security mechanisms. The mean mark for this question was 6.26 out of 15.

The responses of candidates to Part (a) were very general and not related to information technology. In Part (b), most candidates listed appropriate responses for the respective parts such as braille, voice recognition, biometrics, alphanumeric and special characters but did not develop their responses to provide descriptions.

Recommendation to Teachers

Teachers should ensure that students are not only familiar with the various technologies but can explain how they function in the information technology environment.

Question 6

This question tested candidates' knowledge of operations on the World Wide Web. The mean mark for this question was 5.27 out of 20.

In Part (a), candidates were able to correctly write out the acronyms in full but could not explain the functions of the terms. In Part (b), most candidates were able to give an example of a domain name but had difficulty distinguishing between the domain name and the IP address. In general, Part (d) was poorly done since most candidates were unable to effectively give satisfactory explanations of the layers in the protocol.

Recommendation to Teachers

Teachers should thoroughly go through the models, TCP/IP and OSI, noting similarities and differences. Teachers should also highlight that domain name and IP address are completely different.

Section III: Information and Problem Solving

Question 7

This question examined candidates' understanding of the problem solving process as well as the classification and trustworthiness of information sources. The mean mark for this question was 5.61 out of 15.

Candidates were unable to explain clearly why the *analysis of the problem stage* was important and instead gave very vague responses such as 'to understand the problem'. In some instances candidates spoke about the problem definition stage but listed the tools involved in the problem analysis stage. Parts (c) and (d) which dealt with categories of information and trustworthiness were well done.

Recommendation to Teachers

Many students did not provide supporting statements for the points listed. Students should be given activities that will allow them to differentiate between terms such as *state, describe, explain, outline* and *identify* as defined in the syllabus.

Question 8

This question examined candidates' understanding of algorithms, requiring them to explain, decode and write algorithms and to draw a flow chart which represents a given algorithm. The mean mark for this question was 1.75 out of 15.

In Part (a), some candidates stated the functions of algorithms generally and not the function of the specific algorithm given in the question. A few candidates explained the function of each line in the algorithm individually instead of the function of the algorithm as a whole.

In drawing the flow chart, candidates knew the start and stop symbols but did not utilize the correct symbols in the body of the flow chart. Further, they had difficulty illustrating the loop.

In Part (b), although some candidates were able to identify the source of the problem in the algorithm, others gave reasons such as 'temperature should not be 999' and 'the temperature is wrong'.

Recommendations to Teachers

Teachers should use a standardized way of writing algorithms to avoid confusing students as well use flow charts to illustrate algorithms and vice versa. In addition, teachers should emphasize the use of trace tables to determine the output values of an algorithm.

Question 9

This question examined candidates' understanding of different programming paradigms, languages and constructs. The mean mark for this question was 3.80 out of 20.

In Part (a), very few candidates were able to correctly identify the six stages in the program development cycle. Instead, most candidates drew the system development life cycle or the stages in the problem-solving process. In Part (b), most candidates were able to correctly list examples for each programming paradigm but were unable to explain the paradigms using IT terms. For example, the object-oriented paradigm was described as one which uses objects. No mention was made of the data and methods that the object possesses.

In Part (c), some candidates confused assembly language with machine language. In Part (d), although most candidates were able to correctly explain the sequence control structure, the selection and iteration structures proved to be a challenge to the majority of candidates.

Recommendations to Teachers

Students should be given detailed definitions of the various programming paradigms, researching the languages that fall under each paradigm. Teachers should also give students practice in giving detailed explanations of each control structure using acceptable IT terminology.

Paper 031 – School-Based Assessment (SBA)

This project required students to demonstrate their skills in using information processing systems to develop a solution to a problem. Students, with guidance from their teachers, should be encouraged to identify a problem in their environment (school or home) and be discouraged from conceptualizing the solution first and then matching a question to it. This year the mean score was 34.87 out of a possible 60.

The majority of projects were concerned with solving problems involving data storage and retrieval, or operational inefficiencies (reduce waiting time in a line). While these in themselves are acceptable problem areas, many of the projects moderated demonstrated a lack of ability to present a coherent description from problem definition to identification of solutions.

It must be noted that too many teachers were found to be very lenient in their awarding of marks. Teachers are encouraged to follow the guidelines of the mark scheme as closely as possible. Critical weaknesses were seen in *all* sections of the project. The following sections highlight the most glaring weaknesses seen in the reports moderated and offer recommendations that may be used to address those weaknesses.

Problem Definition

Students who scored poorly lacked clarity in how they presented the problem statement.

Many students

- highlighted multiple problems and therefore were unable to define the scope of their solution
- excluded the background to the problem and as a result had no context in which the problem existed

- stated the causes of the problem in this section, instead of the effects the problem had on the organization or individuals
- included solutions in this section of the report.

Recommendations

Students should include a background to the environment in which the perceived problem exists. This background may briefly describe the operational procedures of the organization or group. The problem statement that follows should therefore be as succinct as possible identifying the person or organization affected, the reason for the concern and the result of the effect of this concern.

Gantt Chart

Most students scored full marks for this section. Students were able to produce a Gantt chart which included all stages of the problem-solving process (and any substages) from analysis of the problem to justification of the solution. Although a table design showing successor and predecessor tasks may be useful, marks were awarded solely for representation of the tasks with the use of the Gantt chart.

Students who scored poorly

- used timelines that were unrealistic
- used a table format instead of a chart
- combined tasks and excluded important tasks.

Recommendations to Teachers

Students should be encouraged to create Gantt charts that provide a true reflection of the life of the project. The chart may include the documentation stage that deals with the actual printing, compilation and binding of the project. The charts should have a meaningful heading and axes that are appropriately labelled and scaled. If symbols are used, a legend should be incorporated.

Analysis of the Problem

The majority of students was unable to score full marks for this section for one or several of the following reasons.

- Some students described the problem in detail, but no cause(s) of the problem was/were established.
- It was seen that of the three fact-finding tools used, not all pointed to the cause of the problem.
- Some students listed advantages and disadvantages of using the tool or gave a definition/description of the tool.
- The questions chosen for the interviews and questionnaires were not always relevant to the SBA and very often added no value to the analysis.
- Some students did not interpret the findings obtained from the fact-finding tools and as a result the causes of the problem were not sufficiently established.

Students who received full marks showed the causes that led to the effects that the person or organization was experiencing with appropriate use and analysis of three fact-finding techniques.

Recommendations

Students should use fact-finding tools that are suitable for their project. Questionnaires, interviews and observations are good tools but students should be aware of other tools that can aid in their analysis. Examples of other fact-finding tools are:

- Review of documentation
- Surveys
- Focus groups
- Experiments

For those students who chose to utilize observation as a fact-finding tool, it should be noted that observations cannot be properly done in one visit. A good observation should be carried out over several visits to the entity, at different times of the day and be well documented. An effective observation must indicate the date, time and length of the observation and why those time frames were selected. It is recommended that an observation checklist or schedule be created.

Identification of Possible Solutions

Students who scored partial points or no points:

- Suggested solutions of similar nature without explaining the differences. For example, many students suggested a DBMS and a Spreadsheet as their solutions. Without further explanation or description, these are considered to be one software solution.
- Suggested solutions that only solved specific parts of the problem and not the problem in its entirety.
- Identified non-IT based solutions which were not awarded marks. Flow charts, pseudo-code and data flow diagrams by themselves are not suitable solutions.

Recommendations

Solutions identified should be relevant and realistic to the problem and describe a complete IT-based system. For example, a barcode reader is a hardware component of a point-of-sale system, and, therefore cannot be accepted as a solution. Ideally this section should include a brief description of the features of each suggested information processing system, showing how they will solve the problem. The features to be considered are:

- Procedures
- Personnel and end users
- Network technology
- Software alternatives
- Hardware alternatives

Evaluation of the Possible Solutions

This component required that students objectively evaluate two or more identified solutions.

Students who scored poorly

- failed to describe elements such as hardware, software, cost, personnel, training, reliability, time for development and implementation, environmental effects, security and maintenance
- included advantages and disadvantages of the solutions *only*
- presented tables showing weighted elements but failed to elaborate on the elements and the weights allotted to each. Some of the elements used did not relate to the elements specified in the syllabus.
- evaluated solutions that were not identified previously
- proposed more than one solution but only evaluated the one they believed to be the most feasible solution
- presented only pictures of the hardware components of their identified solutions.

Recommendations

- Evaluate all identified solutions.
- Students should employ a weighted, balanced scorecard that addresses the necessary elements accompanied by an elaboration on the elements, the weights assigned to each and the reason for that assignment.

Selection of Solution

Students were awarded full marks in this section if they identified two unique IT-based solutions and were therefore able to choose one. Students were given no marks if they selected a solution that was not identified in the “Identification of Possible Solutions” section or a manual solution was chosen.

Partial marks were awarded if

- only one solution was identified
- two software solutions were identified without explanation (see Selection of Solution section above)
- one of the solutions identified was a manual solution.

Recommendation

Students should have an explicit section to state the recommended solution. They should refrain from joining this section with the Justification of Solution.

Justification of Solution

On average, most students performed poorly in this section. This component required students to thoroughly analyse the issues related to the implementation of the chosen solution, propose strategies for dealing with the issues and provide an appropriate justification for all the strategies recommended. Many students repeated information from the evaluation section as the justification.

Students who scored poorly

- discussed strengths of the solution only without adding issues that may arise from its implementation
- did not identify any issues pertaining to the implementation of the solution
- did not provide any strategies for handling the issues identified
- did not do any comparison to show why the solution chosen was better than the one(s) rejected in relation to solving the problem identified
- listed advantages and disadvantages of the solution without explaining the applicability to their choice.

Recommendations

- Students can *enhance* their justification with the use of a strengths, weaknesses, opportunities, threats (SWOT) analysis to justify the solution chosen.
- Suggested strategies must provide a clear indication of how each identified issue will be mitigated or eradicated. It should be noted that issues within this section relate to concerns that would result from an implementation of the solution.
- Students should also defend the chosen solution over the other solutions.

Presentation and Communication of Information

This section required students to present their report in a format and style to meet minimum standards of papers for academic purposes. While not included in the criteria being tested, it is expected that students will communicate their findings using correct grammar and utilize the spell check feature found in most word processors. Many students did poorly in this section for a number of reasons.

- They did not present an abstract or the abstract was inappropriate.
- References were either missing or not in a proper MLA or APA format.
- Some students had a table of contents but page numbers were missing or did not correspond to the document. Some page numbers were present but the table of contents was missing.
- The document did not have the proper headings and subheadings.
- There were inconsistencies in font style, size and spacing.
- The cover page was incomplete.

Recommendations

- If questionnaires, interview questions and charts are placed in the appendix they should be referenced in the body of the document.

- Today's word processors include a wizard to create a table of contents with different levels corresponding to headings and subheadings.
- The abstract should only give an overview of the requirements of the project and not a description of the solution.
- Since the report is in print, it is expected that the page numbers be in print as well
- The cover page should include the following:
 - Title
 - Name of Candidate
 - Candidate Number
 - Territory
 - School Name and number
 - Year of Examination
- The project should reflect in its entirety MLA or APA formats. These formats address:
 - Font style (Times New Roman) and size (12) throughout the document
 - Font size and formatting for headings
 - Page margins
 - Line spacing
 - Justification of the document
 - Presentation of sources used

Paper 032 –Alternative to School-Based Assessment (SBA)

This paper is provided for those candidates who do not have the opportunity to register for the examination through an established institution or are unable to make the scheduled classes and wish to prepare themselves through self-paced study. The paper consists of three equally weighted, related questions, which reference a research paper the candidate should have prepared over the year. The paper attempts to mirror the SBA. This year the mean score was 21.0 out of a possible 60.

Question 1

In Part (a), candidates were required to write a description of a problem they researched. The majority of candidates responded by defining the problem. A description of the problem should outline the steps, in order, involved when interacting with the process or system, who interacts with the system and at what point this interaction occurs.

In Part (b), candidates were asked to discuss two causes of the problem. Most candidates responded by saying who or what caused the problem, but did not or could not say why it was a problem. Two separate discussions were expected.

In Part (c), candidates were required to identify a stage in the problem-solving process, other than defining the problem and identifying the solution. Acceptable steps included:

- Analysis of the problem: Data is collected in this stage using various methods (review of documentation, surveys, focus groups and experiments). The analysis of the data should then identify the major cause of the problem.

- Evaluation of solutions: Information technology based solutions are evaluated based on operational feasibility, technical feasibility, personnel requirements and economic or financial feasibility.
- Recommendation of a solution: A solution is selected from those evaluated.
- Justification of recommended solution: The choice of solution is defended based on how the issues that may arise from its choice are dealt with. Issues are (but not limited to) training of personnel, cost to implement, downsizing of staff etc.

In Part (d), candidates were expected to identify instruments for gathering data for three different scenarios. Most candidates were able to identify the tools correctly but were unable to provide appropriate justifications for selecting the tools. However, most candidates performed satisfactorily in Part (e) where they were required to outline limitations of the instruments. Limitations given included scheduling of and time needed for interviews, challenges collecting completed questionnaires and persons being observed demonstrating expected behaviours.

Question 2

This question required candidates to discuss three solutions to the problem described in Question 1, evaluate the feasibility of each solution and explain the benefit of identifying more than one possible solution before deciding on the final solution.

Some candidates identified solutions that were not IT based while others gave solutions which were incomplete and unclear, without further description or explanation. For example, if the problem identified is limited security, identifying a camera as the solution is not satisfactory. A more acceptable response would be *a camera with a motion detector which can record a digital image and save it to a hard drive, where it could be retrieved later.*

In Part (b), most candidates identified cost as a factor to consider when evaluating the feasibility, while training in the use of the solution was also considered.

Most candidates recognized that by identifying several possible solutions the user had a better opportunity to select the best solution using objective means.

Question 3

This question tested candidates' ability to select the most appropriate solution or the next alternative, with justification, and to identify the disadvantages of using the alternative solution.

Candidates who had suggested two or more IT possible solutions were able to identify which solution was most feasible. They gave appropriate reasons for selecting the next best solution although very few candidates could state disadvantages of using this solution over the first.

UNIT 2

Paper 01 – Multiple Choice

This paper comprised 45 items, with 15 items per module. Most candidates performed satisfactorily. The marks on this paper ranged from 10 to 43. The mean score was 64.21 per cent.

Paper 02 – Structured Questions

This paper consisted of nine compulsory questions, three questions per module. The maximum score was 109 out of 150. The mean score was 31.90 per cent compared with 36.25 in 2012.

Section I: Information Management

Question 1

This question examined candidates' understanding of the relational model in database systems. It also evaluated their understanding of different access mechanisms. The mean mark for this question was 3.25 out of 15.

In Part (a), candidates were more familiar with the relational model than the hierarchical approach. Most were able to recall that the hierarchical model was represented as an inverted tree with root node and parent-child relationships. However, candidates did not exhibit a depth of knowledge of the various database design models in order to critically discuss their differences.

In Part (b), in distinguishing between the terms *sequential* and *random access*, many candidates were able to state what each term meant and to identify devices and media that used either method of data storage and retrieval.

The vast majority of responses for Part (c) simply listed some of the general benefits of the Internet without clearly articulating how the services on the Internet actually make data handling and processing more efficient. In Part (d), while a considerable number of candidates correctly identified at least one consequence of an absence of timely data, the majority was unable to explain how this would affect the operations of the company in question.

Recommendations

Teachers should expose students to an in-depth study of the various models of database design. In addition, students need more practice in thinking critically about the impact of ICTs on business processes.

Question 2

This question examined candidates' understanding of entity-relationship diagrams (ERDs) and the general concepts associated with database design. The mean mark for this question was 6.22 out of 15.

In Part (a), most candidates were able to identify at least one element of ERDs. However, some candidates were unable to draw the correct symbol to match corresponding elements. The majority of candidates defined the term *foreign key* instead of stating its function. Part (b) was well done by most candidates who were able to define the term *normalization* as well as explain its benefits.

Recommendations

Teachers should ensure that students can define terms associated with information management as well as explain the functions and benefits of the various tools and processes.

Question 3

This question examined candidates' understanding of database design and normalization. The mean mark for this question was 5.84 out of 20.

Candidates experienced challenges attempting to normalize the database table provided in the question. They demonstrated very minimal understanding of standard form. In addition, their misuse of the technical terms suggested that they were not entirely clear about the exact meaning of important database design ideas. Candidates demonstrated very little understanding of structured query language (SQL).

Recommendations

Normalization should be taught with the use of examples and accompanying explanations and students should have adequate exposure to exercises involving SQL.

Section II: Use of Information Technology Tools

Question 4

This question tested candidates' knowledge of the major software tools and required them to identify the most suitable tools for given situations. In addition, candidates were tested on the specific functions and features of spreadsheets, databases and presentation software. The mean mark for this question was 8.48 out of 15.

The responses to Part (a) revealed that some candidates were not aware of the features, *find and replace* and *header and footer*, in the word processor productivity tool. In Part (b), most candidates were able to identify two situations when it is more appropriate to use a spreadsheet application instead of a database application but could not explain two advantages of a database application over a spreadsheet application.

Part (c), which required candidates to identify features of presentation software which were appropriate for a specific target group was very well done.

Recommendations

Teachers should incorporate case studies while teaching IT in an effort to familiarize students with the practical use of IT concepts.

Question 5

This question assessed candidates' knowledge of web development using html and their understanding of blogs. The mean mark for this question was 4.35 out of 15.

Part (a), which required candidates to reproduce a given web page using html codes, was poorly done by candidates. In Part (b), although most candidates correctly stated the longer term of the word *blog*, some gave erroneous responses such as bloggery and blogosphere. In addition, candidates were generally able to give at least one advantage of a blog over a webpage.

Recommendations to Teachers

Students must be encouraged to utilize html codes to create simple web pages. Exposure to the various types of web pages will be beneficial.

Question 6

This question focused on the use of IT tools to solve real-life problems, information sources and the criteria used to evaluate information. The mean mark for this question was 3.43 out of 20.

Although candidates were able to identify tools that could be used to complete each task, the tools were not always the most appropriate for the unique aspects of the tasks. In Part (b), candidates experienced challenges identifying the most appropriate information sources based on what was required and what the information would be used for.

In Part (c), some candidates correctly stated the criteria to be used but could not fully outline why the criteria was suitable for assessing the appropriateness of the comments and feedback.

Part (d) was poorly done. Most candidates stated recent technological developments but could not link them to the use of IT in health.

Recommendations

Teachers must encourage students to research the use of IT in real-life situations, especially recent innovations in business and industry.

Section III: Social, Organization and Personal Issues

Question 7

This question examined candidates' understanding of the impact of IT on various sectors and job opportunities, the benefits of using IT and procedures for protecting an organization from phishing attacks. The mean mark for this question was 7.17 out of 15.

Although most candidates answered this question satisfactorily, there was limited development of the answers. Candidates were satisfied to simply list the responses without further description or explanation.

Recommendations

Students should be given adequate practice in responding to questions to be able to differentiate between terms such as *state*, *describe*, *explain* and *outline* as defined in the glossary in the syllabus.

Question 8

This question examined candidates' understanding of risks associated with the use of computers, including environmental and health. The mean mark for this question was 4.06 out of 15.

In Part (a), a number of candidates gave general risks of using computers without focusing on used or refurbished computers as required in the question. In Part (b), some candidates confused environmentally friendly with the term *ergonomic* and hence, most of the responses addressed environmental issues.

Recommendations

Teachers need to ensure that students have a sound understanding of the various terms associated with information technology, to avoid confusing concepts. These terms may be reinforced by examining multiple examples of the terms.

Question 9

This question tested candidates' understanding of important issues surrounding the access and use of data and information such as trademark, plagiarism and piracy. The mean mark for this question was 6.15 out of 20.

Generally, candidates performed satisfactorily on this question. They provided fair definitions of the term *trademark* and identified examples of plagiarism. In addition, candidates were able to state ways in which software piracy could affect an organization. However, they experienced challenges explaining how the government could deal with software piracy.

In Part (c), candidates were able to state issues to be considered in an email policy document and also stated how information assets could be protected but were generally unable to give an explanation to support their responses.

Recommendation to Teachers

Teachers must emphasize the need for students to distinguish terms such as plagiarism, piracy and copyright.

Paper 031 – School-Based Assessment (SBA)

This project enabled students to demonstrate their skills in using IT tools to identify and develop a solution to a problem identified in their environment. The structure of the two- year course is such that students can identify a solution in the first year (Unit 1) and continue to develop that solution in the second year (Unit 2). Students may, however, choose to solve a new problem in the second year without penalty.

The SBA is divided into two sections.

1. The report — identifies the problem, gives the analysis of research carried out in relation to the problem and lists the tools used to develop the solution.
2. The solution — the design and development of an application that when implemented can solve the problem identified in the report section.

While the majority of students chose to implement a database for their solution, some chose a website. A very small group of students implemented a web-based solution with a database as the back end.

One major shortcoming found in the presentation of solutions was that students did not provide enough evidence of the development of their solutions. Students are encouraged to submit screenshots of all aspects of their project. This problem was further compounded when there was no soft copy of the project. At moderation, marks cannot be awarded or supported if there is no evidence of the development or a working solution.

While there is no penalty for grammatical or spelling mistakes, students are encouraged to communicate their findings and analyses using standard English. Dialect or creole is unacceptable for a technical report, so too are text messaging shortcuts such as ‘u’ for ‘you’ and ‘2day’ for ‘today’.

Report

Problem Definition

Most students were able to score full marks here. Those who did not score full marks lost marks because they did not clearly define the problem (many subproblems identified and hence the scope of their solution was expanded) or provided no background information to place the problem in context.

Recommendations

Students should be encouraged to

- describe the effects and nature of the problem and whom it affects, in the background
- give a clear description of a single problem
- refrain from including solutions in this section
- state a current problem instead of a problem that is likely to occur.

Analysis of the Problem

The majority of students was unable to score full marks in this section for one or more of the reasons listed below.

- They did not interpret the results using the fact-finding tools.
- Some students discussed findings but did not show the cause(s) of the problem.
- Questionnaires and interview questions were designed to confirm the solution rather than lead to the discovery of the cause(s) of the problem.

Recommendations

- The role of the teacher remains critical in this section of the project.
- Students should be guided in designing their questionnaires, interview questions and any other tool used to gather information.
- The use of open-ended questions should be kept to a minimum.
- The analysis of data must point to the major cause of the problem.
- When discussing the findings the students should indicate which fact-finding tools were used to gather the raw data.

Identification and Justification of IT Tools used in the Solution

This section asked students to identify and justify the use of productivity tools that were used to complete their project.

Students who gained partial or no marks

- identified only one tool
- identified hardware or networking tools
- did not create the solutions themselves but instead used off the shelf solutions such as an existing patient monitoring system.

Recommendations

- The SBA requires the use of more than one productivity tool.
- Students should identify the productivity tools and explain how and why they used specific features of that tool to develop their solution to the problem identified.

Assessment of the Implications of the Solution

The majority of students was able to identify issues involved in the implication of the solution. However, many of them failed to thoroughly discuss all the issues or suggest strategies to address the issues sufficiently. A few students discussed issues that were not relevant to the proposed solution.

Recommendations

Students should be encouraged to tie issues relevant to their proposed solution to the objectives found in Module 3 of the Unit 2 syllabus. While the list of issues may appear quite long, students should be encouraged to discuss at least three issues applicable to their proposed solution.

Solution – Implementation of the Solution

Appropriate Use of IT Tools and their Features

The majority of students was able to show appropriate use of the IT tools. However, a small number of the moderated samples failed to suggest a tool and its use that was appropriate for the identified problem.

Recommendations

Students should be encouraged to suggest tools that are appropriate for the problem they have identified.

Human Computer Interface

The majority of students was able to develop applications with proper navigational features, that is, working buttons linking to pages (next, previous, home and exit buttons on each page or form). While most students were able to create a switchboard for their database application, some of the switchboards had limited navigation, and in some cases, it was impossible to return to the switchboard because there was no active *menu* button to achieve this.

Recommendations

Students should be encouraged to include the above mentioned working buttons on each page or form of their solution. All buttons should be appropriately labelled with consistency in font size, style and colour.

Appropriate Use of IT Tools and their Features

Some students were unable to gain full marks under this section because there was no evidence, in hard or soft copy, of their work.

Recommendations

The features that are discussed under the identification and justification of tools should be applied in this section. All stages of the development of the project should be submitted for moderation.

- For the database solution:
 - Normalization of the tables, table design, relationships, query design, security features, SQL and so on. Screen shots would suffice for most of these.
- For the webpage solution:

- Layout of the pages showing how the pages are linked together.
- HTML code for the home page and unique features of subsequent pages.

Working Solution

The majority of students demonstrated the ability to create a functional database application or webpage. However, all applications or web pages did not effectively solve the problem identified in the problem definition section. Some solutions with security features were inaccessible because there was either no username/password to access the application or the given username/password was incorrect, while some database solutions lacked security features all together.

Further, some students used route relative and/or absolute URL addresses and this posed a problem in accessing the complete website solution.

Recommendations

- Students should be encouraged to include screen shots of their solution, especially those screen shots which would confirm the design of the solution.
- Students should include a text file with the username/password.
- If students customize their database solution to restrict access to the design view (back end), a copy of the administrator's version of the database should also be included to facilitate proper assessment.

Further Recommendations

- It is strongly recommended that a soft copy be submitted. In the absence of a soft copy, screen shots of *every* web page or form along with the design view (all aspects of the database) should be provided.
- All samples should be submitted on one storage medium. Care must be taken in packaging the storage media to minimize the risk of damage.
- Students should package their reports properly to minimize the chance of pages coming loose.

Paper 032 – Alternative to School-Based Assessment (SBA)

This paper is provided for those candidates who do not have the opportunity to register for the exam through an established institution or are unable to make the scheduled classes and wish to prepare themselves through self-paced study.

The paper consists of three equally weighted, related questions, which reference a research paper the candidate should have prepared over the year. The paper attempts to mirror the SBA. This year the mean score was 17.0 out of a possible 60.

Question 1

This question required candidates to write a problem statement, discuss possible causes of the problem, identify data-gathering tools and state phases of the problem-solving process.

None of the respondents was able to succinctly provide a problem statement. Instead, most provided the solution in this question. Further, most candidates provided unnecessary background information in their response to the question. Some candidates provided a problem and solution that was not IT based. An example of a good problem statement is: *The ABC High School requires assistance to reduce the occurrence of break-ins it has experienced in the last two months.*

In identifying the use of a particular data-gathering tool, most candidates were unable to make the connection between the sample size and the data gathering tool to be used. Further, in stating the limitations, candidates were unable to think globally because they attempted to link their project to the tool under consideration.

Question 2

In this question, candidates were asked to identify elements of their computer system, that is, the hardware, software and users. Some candidates gave hardware components that could not be considered essential such as speakers. A camera, without a detailed description of the system in which it is being used, is not an acceptable response.

Similarly, the response to software must also be appropriate. An acceptable response must state the name of the category of software as well as list the specific features of the software. Most candidates were unable to name the level of users of the system or name the users and describe their function/interaction with the system.

In Part (c), candidates were asked to describe their solution in terms of its inputs, processing and outputs. Most candidates seemed unable to correctly identify the inputs to their system. For a security system solution, the inputs for the camera would be either still shot or video of the perpetrator; the processing would be the compression technology used and the output would be the a printed photo or a video on a memory storage card.

Question 3

This question was poorly done. Candidates showed very little knowledge of entities or the entity relationship diagram. Similarly, responses to Part (c) showed very little knowledge of structured query language.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®**

MAY/JUNE 2014

INFORMATION TECHNOLOGY

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GENERAL COMMENTS

This year, approximately 1 190 candidates wrote the Unit 1 examination compared with 1070 in 2013. Performance in 2014 was consistent with that of 2013 — 91 per cent of the candidates achieved acceptable grades compared with 90 per cent in 2013. In Unit 2, approximately 620 candidates wrote the examination compared with 650 in 2013. Of these, 95 per cent achieved acceptable grades compared with 88 per cent in 2012.

While candidates' performance on both units was satisfactory, there were questions where performance was below the required standard. These included questions which tested candidates understanding of qualitative and quantitative data and information sources in Unit 1 and in Unit 2, the data management concepts used in databases.

DETAILED COMMENTS

UNIT 1

Paper 01 – Multiple Choice

The paper comprised 45 items, 15 items per module. Most candidates performed satisfactorily; marks ranged from 9 to 44 and the mean was 57.69 per cent.

Paper 02 – Structured Questions

The paper consisted of nine compulsory questions, three questions per module. The maximum score was 104 out of 150. The mean was 31.47 per cent compared with 32.59 per cent in 2013.

Section I: Fundamentals of Information Technology

Question 1

This question assessed candidates' ability to distinguish between key terms in manual and automated information systems. The mean mark was 2.23 out of 15.

The majority of candidates experienced challenges with Part (a) where they were expected to list corresponding steps in manual and automated information systems and then describe negative impacts of an automated information system (AIS). In Part (b), candidates were asked to identify the type of AIS described in a scenario and outline an advantage and a disadvantage of the identified AIS. The majority of candidates correctly identified the AIS described but candidates struggled to outline one advantage or disadvantage of the AIS.

Recommendations

Candidates should be able to identify corresponding phases of the two processes. Candidates should also be able to identify and discuss different types of AIS. In addition, candidates preparing for the examination should use the glossary provided in the syllabus to become familiar with terms used in

constructing questions. This would provide assistance in determining the quality of response expected.

Question 2

This question assessed candidates' understanding of the characteristics of data and information, knowledge of the characteristics of information sources, and the identification and function of tools used in data collection. The mean mark was 5.25 out of 15.

In Part (a), instead of discussing issues that may affect the quality of the data collected using online questionnaires, many candidates outlined issues with using questionnaires in general. Other candidates only stated the issue that may affect the quality of the data but did not discuss its effect or impact.

In Part (b), candidates were provided with stimulus that presented a real world situation from which they were to extract examples of qualitative and quantitative data. The responses of some candidates suggested that they confused the terms qualitative and quantitative data.

Recommendations to Teachers

Teachers should explore scenarios where qualitative and quantitative data are used and work with students to identify and discuss these different types of data. Teachers should also highlight data quality issues associated with the use of different data collection instruments.

Question 3

This question assessed candidates' understanding of electronic sources of information available on the Internet and examined the tools used to retrieve and store information online. The mean mark was 6.10 out of 20.

Part (a), which required candidates to list electronic sources of information, was generally well answered by candidates. However, in Part (b) (i), candidates misinterpreted the question and gave responses which related to the characteristics of information rather than the sources themselves. When responding to Part (b) (ii), candidates gave general responses such as 'in case of a natural disaster' but failed to mention the key term *backup*.

In Part (c), candidates failed to differentiate between the mailing list and mailing in general. The term 'manual post office' was mentioned on more than one occasion as well as one word responses such as cost, quick and faster, without sufficient explanation.

Recommendations to Teachers

Teachers should utilize the glossary to help students identify and use IT terms correctly in responding to practice questions.

Section II: Information Technology Systems

Question 4

This question assessed candidates' knowledge and understanding of the operating system and open source software. The mean mark was 4.23 out of 15.

In Part (a), candidates were expected to list three types of operating systems (OS) and discuss three functions of the OS. Most candidates were able to identify at least two types of operating systems. Candidates could not be awarded marks for listing types of application software, versions of the Windows operating system or listing the components of the Central Processing Unit. Part a (ii) presented some challenges as candidates were unable to clearly identify the functions of the operating system and lost marks for vaguely identifying the functions of the OS.

In Part (b), most candidates were unable to list types of open source software and instead listed antivirus software as an example of open source software. Other candidates misinterpreted the question and gave varying types of Management Information Systems (MIS).

In addition, while most candidates were able to state at least one benefit of the software, responses were incomplete and hence full marks could not be awarded.

Recommendations to Teachers

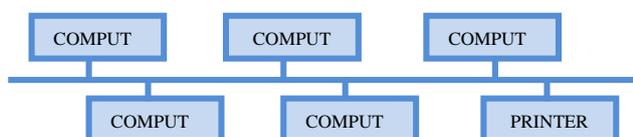
Students must be encouraged to read all questions thoroughly, paying special attention to key words and phrases in an effort to understand the requirements of the question. Teachers should incorporate more student-centred approaches to ensure that students understand and retain the knowledge learnt.

Question 5

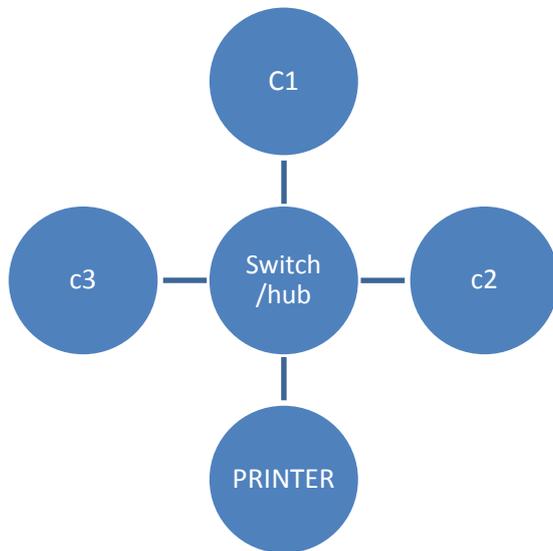
This question assessed candidates' understanding of the purpose of computer networks. It also tested their ability to differentiate between the different network topologies and to apply that knowledge to a given situation. The mean mark was 6.42 out of 15.

Responses to Part (a) were unsatisfactory. Many candidates were unable to give three clear responses with suitable explanations. The most common answers given were resource sharing and communication; some candidates were able to show the relationship between sharing hardware and cost. It was noted that many candidates repeated themselves and gave three examples that illustrated either resource sharing or communication/transfer of data.

Responses to Part (b) (i) were generally satisfactory. However, when illustrating the bus network, many candidates did not clearly show that the computers were separate from the backbone. They also did not label the diagram properly to show the individual nodes and printer attached to the backbone.

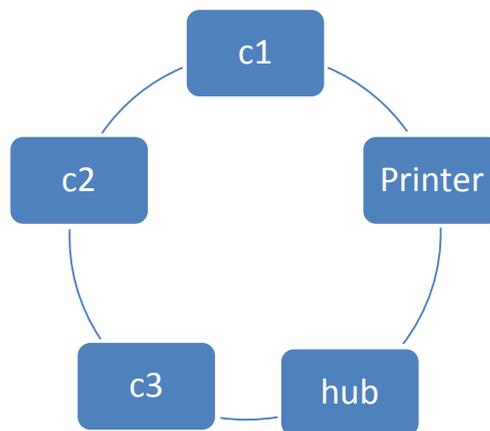


In drawing the star network, some candidates either labelled the diagram incorrectly or did not label it to reflect the given situation. The printer was also placed as the central hub of the network instead of as a node attached to the network.



Part (b) (ii) was very well done. The majority of candidates correctly identified that the computers were not directly connected to each other, but to a central node called a hub or switch, to prevent the network from failing in the event of one computer or cable malfunctioning.

In Part (b) (iii), the majority of candidates illustrated the ring network. Most who drew the ring, however, failed to label the diagram or did not state that data travelled in one direction in the ring network.



Recommendations to Teachers

Teachers should work with students, carefully identifying different network topologies. Further, students should be able to identify a particular topology for a given scenario.

Question 6

This question was designed to assess candidates' understanding of the systems development life cycle (SDLC) and the tools used during the stages of the SDLC. The question also assessed candidates understanding of the World Wide Web (WWW). The mean mark was 7.37 out of 20.

Some of the candidates who attempted Part (a) (i) lost marks for not correctly stating the order of the steps or for excluding critical steps. Further, some candidates stated the advantage without providing enough information to support their response or compared the interview to the questionnaire although the questionnaire was never a part of the question.

For Part (b), some candidates lost marks because they merely stated the description of what a prototype is and not the benefit of using it.

Part (c) was poorly done as candidates were unable to identify and describe client and server software for the WWW. Candidates who attempted this part of the question lost marks because they gave examples of protocols instead of software, described common IT terms which are not related to software or gave examples of URLs and hardware.

Recommendation to Teachers

Teachers need to assist students in developing a clear understanding of the different tools used during the SDLC and the appropriateness of these tools. The concepts related to the WWW should also be emphasized.

Section III: Information and Problem Solving

Question 7

This question assessed candidates' understanding of the problem solving process as well as refereed sources of information. The mean mark was 3.76 out of 15.

In Part (a) (i), candidates gave incorrect responses such as the first and the last steps in an algorithm or the system development life cycle or simply 'start' and 'stop' or 'planning and testing'. It was evident that some candidates confused the problem solving process with the programming process. In Part (a) (ii), many candidates were able to identify appropriate questions but did not provide a detailed description as required.

Most candidates misinterpreted Part (b), providing information about the animals' disease rather than the three pieces of information needed when searching for refereed sources. Acceptable responses include *author credentials*, *title of journals*, *cost of accessing the sources* or *the location of the sources*.

Recommendations to Teachers

The difference between the problem solving process and the programming process needs to be emphasized, supported by authentic examples of each.

Question 8

This question assessed candidates' understanding of data flow diagrams (DFDs), object-oriented and other programming paradigms. The mean mark was 4.89 out of 15.

Part (a) was generally well done by candidates. However, in Part (a) (i), some candidates referred to the Context Level Diagram and the Level 0 Diagram as different diagrams.

Part (b) was poorly done by candidates. Most candidates experienced challenges using the appropriate jargon and identifying the benefits or features of the object-oriented programming paradigm.

Recommendations to Teachers

Teachers should explore the use of examples where different programming paradigms can be used and discuss with students the benefits of selecting a particular paradigm for a given task.

Question 9

This question assessed candidates' understanding of programming, the programming process and the program development cycle. The mean mark was 7.64 out of 20.

Part (a) was generally well done. However, many candidates gave responses such as 'while', 'for', and 'if-then' instead of *Sequence*, *Selection*, and *Iteration* or *Looping*.

While most candidates agreed that it was useful to draw a flowchart, they failed to explain why it was advantageous. An example of a suitable answer would be: *A flowchart is easier to understand since it is a pictorial representation of the algorithm.*

Part (b) was satisfactorily done by most candidates. However, some candidates failed to represent the *while loop* correctly in the diagram and did not clearly indicate the flow of instruction. A few candidates drew the flowchart symbol with the instruction at the side of the symbol. It should be noted that the instruction should be placed inside the flowchart symbol. Also, there was confusion between flowchart symbols and data flow diagram symbols.

In Part (c) (i), candidates correctly identified answers such as *Implementation* and *Evaluation*. However, a few candidates identified steps that came before the testing stage. In keeping with a practice noted throughout the examination, candidates correctly stated problems in Part (c) (ii) but omitted an explanation.

Recommendations to Teachers

Teachers should ensure that students are able to differentiate between the verbs *list* and *explain*. Students should be reminded that they should use the correct symbols when constructing flowcharts and more focus needs to be placed on representing loops in flowcharts.

Paper 031 – School-Based Assessment (SBA)

This project enabled students to demonstrate their skills and competence in using information processing systems to develop a solution to a problem. Students, with guidance from their teachers, were expected to identify a problem in their environment. In contrast to 2013, most candidates clearly defined a background to the problem. However, many teachers were lenient and awarded marks that could not be justified at moderation. Teachers are therefore encouraged to follow the guidelines of the mark scheme as closely as possible. While improvements were seen in the reports, there are still critical weaknesses in some major sections of the project. The following sections highlight some of these weaknesses and offer recommendations that may be used to address them.

Problem Definition

Students who scored poorly lacked clarity in how they presented the problem statement. Students

- highlighted multiple problems and therefore were unable to define the scope of their solution
- stated the causes of the problem in this section, instead of the effects the problem had on the organization or individuals
- included solutions in this section of the report.

Recommendations

In defining the problem, students should develop a clear and concise problem definition that is limited to two or three sentences and includes one clearly defined problem, the person or organization affected, the reason for the concern and the effect on the person or organization.

Gantt Chart

The Gantt charts were an improvement from 2013 as students were able to produce Gantt charts which included all stages of the problem solving process from analysis of the problem to justification of the solution. Although a table design showing successor and predecessor tasks may be useful, marks were awarded solely for representation of the required tasks with the use of the Gantt chart.

Students who scored poorly:

- Had timelines that were unrealistic. For example, it is very unlikely that the three data collection methods can be employed and analysed in less than one week.
- Used inappropriate units of measurement which made it difficult to determine the length of a task.
- Used a table format instead of a chart.
- Combined tasks.
- Excluded important tasks.
- Had axes that were not clearly or correctly labelled.

Recommendations

Students should be encouraged to use appropriate productivity tools to produce the chart instead of drawing them manually. The charts should provide a true reflection of the life of the project including the documentation stage that deals with the actual printing, compilation and binding of the project. The units should be clearly defined and applied consistently across tasks.

Analysis of the problem

Students were able to identify and use fact-finding techniques outside of the traditional techniques as well as gather data using the appropriate tool. Most students effectively used the observation technique by reporting multiple visits. Some students listed advantages and disadvantages of using the tool or gave a definition. The majority of students was unable to score full marks for this section for one or several of the following reasons:

- The questions asked were leading questions and students were therefore unable to interpret the information to show the problem. For example, when looking at an operational inefficiency, many questions were of the form ‘Do you think that an automated system would speed up this process?’ A more meaningful question may be ‘What do you think is the main cause of these long lines?’
- It was seen that of the three fact-finding tools used, not all pointed to the cause(s) of the problem.
- Development of the analysis was primarily on one tool rather than the three tools being used.
- The questions chosen for the interviews and questionnaires were not always relevant to the SBA and often added no value to the analysis.
- Some students did not interpret the findings obtained from the fact-finding tools and as a result the cause(s) of the problem were not sufficiently established.

Students who earned full marks showed the causes that led to the effects that the person or organization were experiencing, with appropriate use and analysis of three fact-finding techniques.

Recommendations to Teachers

The teacher should provide guidance in the structuring of questions and checklists. Students should only include graphs where appropriate. For example, it is unnecessary to provide a pie chart to summarize the responses to a question requiring a yes or no answer. Students are encouraged to thoroughly analyse the possible causes, utilizing the data tools to gather information on the causes for future interpretation, rather than approach the data capturing techniques with preconceived ideas of how the problem should be resolved.

Identification of Possible Solutions

Students who scored partial or no points

- listed solutions without supportive details.
- suggested solutions of similar nature without explanation of the differences. For example, many students suggested a DBMS and a spreadsheet as their solutions without a detailed explanation of how they would be utilized.
- suggested solutions that only solved specific parts of the problem.
- identified non-IT based solutions. Images or graphics of hardware and software are not suitable solutions.

Recommendations

Solutions identified should be relevant and realistic to the problem and describe a complete IT based system. For example, a barcode reader is a hardware component of a point-of-sale system, and therefore, cannot be accepted as a solution. Ideally this section should include a brief description of the features of each suggested information processing system, showing how they will solve the problem. The features to be considered are:

- Procedures
- Personnel and end users
- Network technology (if any)
- Software alternatives and
- Hardware alternatives

Evaluation of the Possible Solutions

This component required that students objectively evaluate two or more identified solutions. In the evaluation of a solution, it was expected that students would address issues that may arise from the implementation of each proposed solution. Students who scored poorly on this section

- failed to describe all the elements, besides hardware and software that may be associated with a particular solution. Elements such as *cost, personnel, training, reliability, time for development and implementation, environmental effects, security and maintenance* were excluded.
- included advantages and disadvantages of the solutions only.
- failed to show the relevance of the attributes or criteria being evaluated. For instance, in terms of measurements, students failed to show what constitutes high, medium, low, and why a certain rank was selected.
- evaluated solutions that were not identified previously.
- proposed more than one solution but only evaluated the one they believed to be the most feasible.

Recommendations

Students are expected to evaluate all identified solutions. All the necessary elements as they relate to their implications on the economic, social, political, technical, operational and schedule feasibility for an organization or individual should be examined. Students should also elaborate on the elements and the weights assigned to each.

Selection of Solution

Students were awarded full marks in this section if they identified two unique IT based solutions and further selected one of these solutions. No marks were awarded if they selected a solution that was not identified in the 'Identification of Possible Solutions' or a manual solution was chosen. This year, more students were able to properly select an IT solution compared with previous years. Partial marks were awarded if

- only one solution was identified in the 'Identification of Possible Solutions'
- two software solutions were identified without explanation
- one of the solutions identified was a manual solution.

Recommendations

Students should refrain from combining this section with the Justification of Solution since an important component of the project is clearly identifying the solution.

Justification of the Solution

Generally, most students performed poorly in this section. This component required students to thoroughly analyse the issues related to the implementation of the chosen solution, propose strategies for dealing with the issues, and provide an appropriate justification for all the strategies recommended. Many students repeated information from the evaluation section as justification. However, some students identified issues pertaining to the implementation of the solution and used SWOT (strengths, weaknesses, opportunities, and threats) and cost-benefit analyses. Students who scored poorly

- discussed strengths of the solution only, without adding issues that may arise from its implementation
- did not provide any strategies for handling the issues identified
- did not do comparison to show why the solution chosen was better than the one(s) rejected in relation to solving the problem identified
- listed advantages and disadvantages of the solution without explaining the applicability to their choice.

Recommendations

While students utilized SWOT analysis, the elements of the analysis needed to be better developed to justify the solution chosen. The suggested strategies should provide a clear indication of how EACH identified issue will be mitigated or eradicated. Students should also defend the chosen solution over the other solutions identified if the other solution(s) appeared to be the better choice.

Presentation and Communication of Information

This section required students to present their report in a format and style to meet the minimum standards of papers for academic purposes. Most students provided headings and subheadings throughout the document. While not included in the criteria being tested, it is expected that students will communicate their findings using correct grammar and utilizing the spell check feature found in most word processors. Many students did poorly in this section for one or more of the following reasons.

- They did not present an abstract or the abstract was inappropriate.
- References were either missing or not in the MLA or APA format.
- Some students included a table of contents but page numbers were missing; or page numbers were present but the table of contents was missing.
- Some students presented a table of contents but the page numbers within the document did not correspond to the page numbers in the table of contents.
- There were inconsistencies in font style, size and spacing.
- The cover page was incomplete.

Recommendations

If questionnaires, interview questions and charts are placed in the appendix they should be referenced in the body of the document. Students should utilize the features of the word processor such as the wizard for creating the table of contents with different levels corresponding to headings and sub-headings. Since the report is word processed, it is unacceptable at this level to insert handwritten page numbers or titles. The cover page should include the following:

- Title
- Name of Candidate
- Candidate Number
- Territory
- School Name
- Center Number
- Year of Exam

Paper 032 –Alternative to School-Based Assessment (SBA)

This paper is provided for those candidates who did not have the opportunity to register for the examination through an established institution or were unable to attend the scheduled classes and wished to prepare themselves through self-paced study. The paper consists of three equally weighted, related questions, which reference a research paper the candidate should have prepared over the year. This year the mean score was 25.72 out of a possible 60.

Question 1

In Part (a), candidates were required to write a description of a problem they researched. The majority of candidates responded by defining the problem. A description of the problem should outline the steps involved when interacting with the process or system, who interacts with the system and at what point this interaction occurs.

In Part (b), candidates were asked to discuss two causes of the problem. Most candidates responded by saying who or what caused the problem, but did not state why it was a problem. Two separate discussions were expected. In Part (c), candidates were required to identify the appropriate use of three data gathering tools, while in Part (d), candidates were expected to discuss how each of the tools in Part (c) could be implemented using the Internet.

Question 2

This question required candidates to discuss three solutions to the problem described in Question 1, evaluate the feasibility of each solution and explain the benefit of identifying more than one possible solution before deciding on the final solution.

Some candidates identified solutions that were not IT based while others gave solutions which were incomplete and unclear, without further description or explanation. For example, if the problem identified is limited security, identifying a camera as the solution is not satisfactory. A more acceptable response would be *a camera with a motion detector which can record a digital image and save it to a hard drive where it could be retrieved later.*

In Part (b), most candidates identified cost as a factor to consider when evaluating the feasibility, while training in the use of the solution was also considered. In Part (c), candidates had to explain the benefits of identifying several solutions prior to selecting a final solution. Most candidates recognized that by identifying several possible solutions the user had a better opportunity to select the best solution using objective means.

Question 3

This question tested candidates' ability to select the most appropriate solution or the next alternative, with justification, and to identify the disadvantages of using the alternative solution.

Candidates who had suggested two or more possible IT solutions were able to identify which solution was most feasible. They gave appropriate reasons for selecting the next best solution although very few candidates could state disadvantages of using this solution over the first.

UNIT 2

Paper 01 – Multiple Choice

This paper comprised 45 items, with 15 items per module. Most candidates performed satisfactorily. The marks on this paper ranged from 12 to 44. The mean score was 62.76 per cent.

Paper 02 – Structured Questions

This paper consisted of nine compulsory questions, three questions per module. The maximum score was 119 out of 150. The mean score was 38.40 per cent compared with 31.90 in 2013.

Section I: Information Management

Question 1

This question assessed candidates' ability to distinguish key terms in data management such as data warehouse, data mart and data mining. Candidates were asked to draw a diagram to illustrate an example of a data warehouse and explain three other characteristics of a data warehouse. The mean mark was 2.20 out of 15.

In Part (a) (i), most candidates received one out of the two marks because they did not provide adequate descriptions of the terms. The responses appeared incomplete. In Part (b), candidates experienced challenges drawing a suitable diagram to illustrate an example of a data warehouse while in Part (c), candidates were unable to explain the characteristics of a data warehouse.

Recommendations to Teachers

Teachers should ensure that students develop an appropriate glossary of data management terms and an understanding of the difference among the terms. The completion of the SBA project would help students clarify these terms.

Question 2

The focus of this question was to assess candidates' ability to describe the various types of file organizations and to construct a database, more specifically, to demonstrate an understanding of primary keys, data types, the not null property and writing queries using SQL. The mean mark was 5.20 out of 15.

In Part (a) (i), candidates were able to identify the purpose of the primary key. Most candidates stated that it is *a unique identifier for the records in a table*. However, a few thought that the primary key uniquely identifies the tables in a database. In Part (a) (ii), candidates were also able to adequately state the purpose of *not null*.

Part (b), which required candidates to explain the use of *char* in the database design, was the best answered part of this question. Almost all candidates correctly explained that *the type of data to be entered in the field had to be alphanumeric/text/characters*.

In Part (c), candidates were asked to perform SQL operations on a given table. The operations included writing an update query, a delete query and a select query. Although these queries are considered basic knowledge, it was evident that most candidates had limited experience in writing SQL statements and as such candidates were unable to write the required statements. In Part (d), most candidates were able to describe the serial file and direct file organization but experienced challenges describing index-sequential file organization.

Recommendations to Teachers

Teachers should utilize project-based assignments using SQL to teach DBMS.

Question 3

This question assessed candidates' understanding of concepts on database design. In particular, candidates were expected to demonstrate their understanding of normalization and ER diagrams. The mean mark was 5.69 out of 20.

In Part (a), candidates were asked to explain the process of normalization using 1N, 2N, 3NF. Candidates struggled to explain normalisation using these sub-concepts. In Part (b), candidates were expected to explain, using appropriate examples, different anomalies associated with database design. Many candidates were unable to clearly explain these anomalies or provide examples. In Part (c), some candidates were unable to identify and describe the relationships of the ER diagram shown or describe other types of relationships that may exist in an ERD.

Recommendations to Teachers

Teachers should guide students to develop an outline of the normalization process and highlight all the normal forms required. A practical exercise, involving the development of a database to resolve a problem, should be explored.

Section II: Use of Information Technology Tools

Question 4

This question assessed candidates understanding of the utilization of IT tools in an organization. This question was fairly well answered by candidates. The mean mark was 7.12 out of 15.

Part (a) assessed candidates understanding of the reasons for using IT tools in organizations. While most candidates scored satisfactorily on this question, some candidates lost marks for not fully explaining how these benefits directly enhanced the business. Additionally, candidates lost marks for generally stating the use of computers in the business without focusing on the use of IT tools.

In Part (b), candidates were expected to state three features of a database management tool and state reasons why Microsoft Access is a more appropriate tool for managing company data, as compared with a word processing tool. Although the majority of candidates attempted this part of the question and knew the functions of both Microsoft Access and a word processing tool, they failed to highlight the features of Access that would make it more suitable for data management.

Recommendations to Teachers

Teachers should work with students to develop an understanding of the appropriateness of various software tools for different scenarios or situations.

Question 5

This question assessed candidates understanding of the criteria used for selecting an IT tool for a particular problem. The question also examined candidates' understanding of emerging technologies, types of web pages and their operations. The mean mark was 6.44 out of 15.

The responses to Part (a) were unsatisfactory. Many candidates misinterpreted the question and gave answers that related to the purpose of the tools. The candidates who scored full marks stated the required criteria such as:

- Nature of the problem
- Type of data
- Type of storage or access method
- Type of process required

Part (b) was well done by most candidates as they were aware of emerging technologies relating to visually impaired persons. However, some candidates supplied a Braille keyboard as an emerging technology which was not awarded full credit. A more appropriate response would be the use of voice recognition technology in GPS systems, smart phones or intelligent appliances like refrigerators and washing machines.

In Part (c), most candidates were able to identify three types of web pages and correctly describe the operations of the respective web pages. However, some descriptions lacked detail, while in a few instances the description was matched with the incorrect web page.

Recommendations to Teachers

Teachers should ensure that students are familiar with the criteria for selecting IT tools for various tasks. Further, authentic scenarios would assist students in understanding the importance of these criteria.

Question 6

This question was designed to examine candidates' understanding of Information Technology Systems. The mean mark was 7.62 out of 20.

In Part (a), candidates were required to describe two characteristics of an information source. As in previous questions, some of the responses lacked sufficient detail. Some candidates stated the characteristics of information instead of information sources. In Part (b), candidates were required to explain two advantages of presenting information in a graphical format. Some expected advantages are:

- keeps the audience interested
- appeals to persons of all ages
- allows visualization of concepts
- supports easier interpretation of data
- allows easier analysis of data

In Part (c), candidates were expected to explain the purpose of hyperlink in an HTML document. Most candidates were awarded one of the two allotted marks since they simply stated ‘to move from one place to another’. The response should have provided additional information such as how to navigate between HTML documents. One of the better responses was: *A hyperlink is a word, group of words, or image in an HTML document that you can click on to move to a new section within the document or to a new document.*

In Part (d), candidates were expected to write the code snippet to create a hyperlink to the URL *ww.cxc.org*. One appropriate response was:

```
<a href = "http://www.cxc.org" /> click here </a>
```

Candidates would have received marks for

- ✓ Use of the anchor tag (<a>)
- ✓ Use of the href attribute
- ✓ Use of the link text (*Click here* – or any other phrase)

Some candidates lost marks for

- Not including a link text
- Incorrect spelling of the attribute href
- Omitting the anchor tag.

In Part (e), candidates were required to write the HTML code to update a web page with the given content. Responses to this part of the question were satisfactory. However, some candidates did not recognize the paragraph section or used the ol tag instead of the ul tag.

One appropriate response was:

```
<p> Our motto is: </p>
<ul>
  <li> Spirit </li>
  <li> Energy </li>
  <li> Innovation </li>
</ul>
```

Recommendations

Teachers should highlight the difference between information characteristics and information source characteristics. In addition, students should be encouraged to write HTML code using a text editor.

Section III: Social, Organization and Personal Issues

Question 7

This question tested candidates' ability to discuss two ways in which information technology impacts positively on employment and to discuss three health risks associated with improper computer usage in the work place. The mean mark was 8.61 out of 15.

Overall, responses to this question were good. However, some candidates provided the failed to answer this question directly as it relates to the negative impact IT on employment. In Part (b), candidates were able to identify the health risks required.

Recommendations to Teachers

Teachers should continue to use case studies as authentic examples of the impact of information technology on various aspects of life since they would assist students in developing an understanding of the associated issues.

Question 8

This question assessed candidates understanding of the need to protect information systems from natural disasters and human interference. The mean mark was 7.22 out of 15.

While responses to Part (a) were satisfactory, some candidates were unable to state how the organization's information was compromised by unauthorized access. Responses to Parts (b) and (c) were unsatisfactory since candidates failed to provide ICT solutions.

Recommendation to Teachers

In teaching, teachers must address the impact of natural disasters as well as risks associated with the environment and human interference since these are critical issues that may need to be addressed by businesses and home users.

Question 9

This question assessed candidates understanding of virtual organizations, computer crimes and policies to safeguard information assets. The question also examined candidates' understanding of software piracy in the context of software developers. The mean mark was 8.35 out of 20.

In Part (a), most candidates were able to state that a virtual organization operates on the World Wide Web or the Internet but failed to properly define the concept. In addition, they were able to identify at least one advantage of a virtual organization. However, in some instances, candidates gave advantages of using the Internet instead of providing a comparison between a traditional and a virtual organization.

In Part (b) (i), some candidates incorrectly defined a computer crime as 'the unauthorized accessing of a computer', which is the definition of hacking. Some candidates also stated that 'it is doing harm to the computer'. An appropriate response would have been: *using the computer and other technology to*

commit a crime. However, although the definition proved challenging, candidates were able to identify examples of computer crimes.

In Part (c), some candidates only identified the policies but did not provide a discussion. A number of candidates gave specific examples such as firewalls, passwords, biometrics, while the expected response was general strategies such as Internet policies that focus on Internet use, website access, attachments, downloads and so on.

In Part (d), candidates failed to properly discuss the consequences and instead they stated what the consequences were. Many candidates misinterpreted the question and gave the consequences as it related to the pirate and not the software developer.

Recommendation to Teachers

Teachers should use actual case studies on computer crimes to teach these concepts since they would engage students in a more real and practical way.

Paper 031 – School-Based Assessment (SBA)

This project enabled students to demonstrate their skills in using IT tools to identify and develop a solution to a problem identified in their environment. The structure of the two year course is such that students can identify a solution in the first year (Unit 1) and continue to develop that solution in the second year (Unit 2). Students may, however, choose to solve a new problem in the second year without penalty.

The SBA is divided into two sections.

1. The Report — identifies the problem, gives the analysis of research carried out in relation to the problem and lists the tools used to develop the solution.
2. The Solution — the design and development of an application that when implemented can solve the problem identified in the Report section

The majority of students scored full marks in the problem definition and the analysis of the problem. However, the sections ‘Identification and Justification of IT Tools Used in the Solution’ and ‘Assessment of the Implications of the Solution’ were not completed satisfactorily by a number of students.

As in previous years, students did not provide enough evidence of the development of their solutions. Students are encouraged to submit screenshots of all aspects of their project as well as a soft copy of the project. This will assist in the moderation activity as supporting evidence of the development or a working solution.

Another shortcoming identified in the projects submitted for moderation was that of communication. While there is no penalty for grammatical or spelling mistakes, it is strongly suggested that students be encouraged to communicate their findings and analyses using Standard English. Dialect or Creole

is unacceptable for a Technical Report, so too are text messaging shortcuts such as ‘u’ for you and ‘2day’ for today.

Teachers are encouraged to

- carefully follow the marking scheme suggested by the CXC
- guide students to design unique solutions and not impose a method of design
- ensure all cover pages have
 - project titles
 - candidate numbers
- generate, for students, a checklist for the use of the storage media to include
 - files copied
 - files open
 - storage media attached
 - correct password attached

Report

Problem Definition

Most students were able to score full marks in this section of the report. However, some did not clearly define the problem and omitted the background information needed to place the problem in context.

Recommendations

Students should:

- give a clear description of a single problem as well as a clear definition of the scope of their problem
- provide adequate background information to show who or what is affected by the problem identified
- refer to the Unit 1 SBA report ‘Problem Definition’ section for guidance.

Students should also note that solutions should not be included in this section.

Analysis of the Problem

A significant number of the projects which were moderated were unable to score full marks in this section because

- the results were not interpreted using the fact-finding tools;
- some students discussed findings but did not show the cause(s) of the problem
- questionnaires and interview questions were designed to confirm the solution rather than lead to the discovery of the cause(s) of the problem.

The role of the teacher remains critical in this section of the project. Students should be guided in designing their questionnaires, interview questions and any other tool being used to gather information. On questionnaires, the use of open-ended questions should be kept to a minimum.

Recommendations

- When discussing the findings, there should be an indication of which fact finding tools were used to gather the raw data.
- The analysis of the data must point to the major cause of the problem.
- Within the body of the report, reference should be made to the use of tools which are placed within the appendix.

Identification and Justification of IT Tools used in the Solution

This section asked students to identify and justify the use of productivity tools and features of the tools that were used to complete the project.

No marks or partials marks were given to students who:

- Identified only one tool.
- Identified hardware or networking tools.
- Did not create the solutions themselves but instead used off-the-shelf solutions such as an existing Patient Monitoring System.

Recommendations

- The SBA requires the use of more than one productivity tool (c/f Unit 2 Module 2 Specific Objectives 1 – 6 of the Syllabus).
- Students should identify the productivity tools and explain how and why they used specific features of the tool or tools to develop their solution to the problem identified.

Assessment of the Implications of the Solution

The majority of students was able to identify issues involved in the implication of the solution. However, many of them failed to thoroughly discuss all the issues or suggest strategies to address the issues sufficiently. Some students discussed strengths or benefits of the proposed solution and a few students discussed issues that were not relevant to the proposed solution.

Recommendations

Students should be encouraged to tie issues relevant to their proposed solution to the objectives found in Unit 2, Module 3 of the syllabus. While the list of issues may appear quite long, students should be encouraged to thoroughly discuss at least three issues applicable to their proposed solution.

Solution – Implementation of the Solution

Appropriate use of IT Tools

The majority of students was able to show appropriate use of the IT tools. Some students justified the use of tools but this is not required in this section.

Recommendations

- Students should be encouraged to implement tools that are appropriate for the problem they have identified. For instance, a problem focused on marketing or advertising is better suited for a web site solution, whereas a problem involving inventory, storage, and retrieval is better suited for a database solution.
- The blanket use of website templates should be strongly discouraged. However, if templates are used, students should demonstrate the ability to customize the templates to sufficiently exhibit their ability to construct a website solution.

Human Computer Interface

The majority of students was able to develop applications with proper navigational features, that is, working buttons linking to pages (next, previous, home and exit buttons on each page or form).

While most students were able to create a switchboard for their database application, some of the switchboards had limited navigation, and in some cases, it was impossible to return to the switchboard because there was no active ‘menu’ button to achieve this.

Recommendations

- Students should be encouraged, as part of the user-friendliness of the solution, to include the above mentioned working buttons on each page or form of their solution.
- All buttons must be appropriately labelled with consistency in font size, style and colour.

Appropriate use of Features of IT Tools

Some students were unable to gain full marks under this section because there was no evidence, in hard or softcopy, of their work.

Recommendations

The features that are discussed under ‘Identification and Justification of the Tools’ should be applied in this section.

All stages of the development of the project should be submitted for moderation.

- For the database solution:
 - Use of screen shots would suffice for normalization of the tables, table design, relationships, query design, security features and SQL
- For the web page solution:
 - Layout of the pages showing how the pages are linked together
 - HTML code for the home page and unique features of subsequent pages

Working solution

The majority of students demonstrated their ability to create a functional database application or web page. However, all applications or web pages did not effectively solve the problem identified in the problem definition section. Some solutions with security features were inaccessible because there was either no username or password to access the application or the given username or password was incorrect, while some database solutions lacked security features all together. Further, there were students who used absolute URL addresses instead of relative addressing, resulting in a problem accessing the complete website solution.

Recommendations

- Students should be encouraged to include screen shots of their solution, especially those screen shots to confirm the design of the solution.
- Students should include a text file with the username or password, as well as the version of the software used, for instance, Microsoft Access 2010.
- If students have customized their database solution so as to restrict access to the design view (back end), a copy of the administrator's version of the database should also be included to facilitate proper assessment.

General Recommendations

- It is strongly recommended that a soft copy of the project be submitted. In the absence of a soft copy, screen shots of every web page or form along with the design view (all aspects of the database) should be provided.
- Submit all samples on one storage medium, preferably a flash drive for database files, since optical discs, which are read only (ROM) storage, affect the functionality of some database features. Care must be taken in packaging the storage medium to minimize the risk of damage to the medium.
- Students should package their report properly to minimize the chance of pages coming loose.

Paper 032 – Alternative to School-Based Assessment (SBA)

This paper is provided for those candidates who do not have the opportunity to register for the examination through an established institution or are unable to make the scheduled classes and wish to prepare themselves through self-paced study.

The paper consists of three equally weighted, related questions, which reference a research paper the candidate should have prepared over the year. The paper attempts to mirror the SBA. This year the mean score was 26.33 out of a possible 60.

Question 1

This question required candidates to write a problem statement, discuss possible causes of the problem, identify data-gathering tools and state phases of the problem-solving process. Instead of limiting their responses to a succinct problem statement, most candidates provided unnecessary background information, while some candidates provided a problem and solution that was not IT based. An example of a good problem statement is: *The ABC High School requires assistance to reduce the occurrence of break-ins it has experienced in the last two months.*

In identifying the use of a particular data-gathering tool, most candidates were unable to make the connection between the sample size and the data gathering tool to be used. Further, in stating the limitations, candidates did not respond globally but attempted to link their project to the tool under consideration.

Question 2

In this question, candidates were asked to summarize their solution to the problem identified in Question 1 and discuss the likely impacts this solution may have on the organization. In addition, candidates were asked to identify elements of their computer system, that is, the hardware, software and users. Some candidates gave hardware components that could not be considered essential such as speakers. Similarly, responses to software components must also be appropriate. An acceptable response must state the name of the category of software as well as list the specific features of the software.

In Part (c), where candidates were required to describe their solution in terms of its inputs, processing and outputs, candidates experienced challenges correctly identifying the inputs to their system. To use the camera as an example, *the inputs would be still shot or video of the perpetrator; the processing would be the compression technology used and the output would be a printed photo or a video on a memory storage card.*

Question 3

Very few candidates completed Question 3 satisfactorily. Candidates displayed little knowledge of entities, the entity relationship diagram or the structured query language.

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®**

MAY/JUNE 2015

INFORMATION TECHNOLOGY

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GENERAL COMMENTS

This year, approximately 1280 candidates wrote the Unit 1 examination compared with 1190 in 2014. Performance in 2015 was consistent with that of 2014 — 97 per cent of the candidates achieved acceptable grades compared with 91 per cent in 2014. In Unit 2, approximately 710 candidates wrote the examination compared with 620 in 2014. Of these, 98 per cent achieved acceptable grades compared with 88 per cent in 2014.

While candidates' performance on both units was satisfactory, there were questions where performance was below the required standard. These included questions which tested candidates' understanding of qualitative and quantitative data and information sources in Unit 1 and in Unit 2, the data management concepts used in databases.

DETAILED COMMENTS

UNIT 1

Paper 01 – Multiple Choice

The paper comprised 45 items, 15 items per module. Most candidates performed satisfactorily; marks ranged from 7 to 43 and the mean was 60.52 per cent.

Paper 02 – Structured Questions

This is the first examination where the paper consisted of six compulsory questions, two questions per module. The maximum score was 117 out of 150. The mean score on the paper was 61.29 per cent.

Section I: Fundamentals of Information Technology

Question 1

This question assessed candidates' understanding of data and information; their relationship to each other, their characteristics and their relationship to knowledge. The mean mark was 9.07 out of 25.

In Part (a), most candidates were awarded for listing the terms *data*, *information* and *knowledge* in this order since the question gave the terms out of sequence. A second mark was awarded if an arrow going from *data* to *information* was labelled *processing*, *meaning applied* or any other phrase that implied candidates had some knowledge of the relationship between data and information. Some candidates gave descriptions of data, information and knowledge, with arrows linking the boxes which was also accepted.

In Part (b) (i), the majority of candidates was able to state that *a wiki is a website, an online information source*. Any other phrase which indicated that candidates recognized that a wiki was based on the internet was also awarded. An additional mark was awarded for saying that *anyone who accessed a wiki could edit the contents of the webpage*.

For Part (b) (ii), most candidates stated, as disadvantages, that anyone was able to edit the website, that the information was not up to date, credible or reliable. Since these reasons have to do with the fact that anyone can edit the website, candidates were awarded only one of the two marks.

The majority of candidates was able to gain the two marks in Part (b) (iii). A very small minority stated CDs/DVDs; while these are mentioned in the syllabus, a complete response should be *a CD with an encyclopaedia stored on it*. The candidates were awarded the mark as per the syllabus.

In Part (b) (iv), the majority of candidates was able to list two advantages for each information source. However, many of them were unable to say why it was considered an advantage. As an example, with reference to an online library, candidates could identify access to the internet as an advantage but were unable to link this to the idea of completing research from the comfort of the home or the ability to access texts at any time. Too many candidates were caught up with the characteristics of the information contained in the source. A few candidates answered the question by referring to the disadvantages of the information source.

In Part (c), many candidates focused on the characteristics of information and, as a result, missed the focus of the question. It was hoped that candidates would have recognized that *the quality of the data is related directly to the quality of the decisions made and as a result a positive outcome is expected*. As an example, in a business entity, the manager is able to make the right decision based on the information received; therefore, his company is able to see a profit in the investment.

Part (d) was poorly done by the majority of candidates. Candidates who mentioned that *inaccurate records could mean that a child could be treated for something unnecessarily* were given credit. A full discussion was then required for the next two marks.

Many candidates demonstrated that they had no idea what timeliness as a characteristic of information was. Many responses indicated that they associated timeliness with speed of access.

Recommendations to Teachers

Teachers should focus their efforts on reinforcing the relationship between information and knowledge. Students should be made aware of as many weaknesses or strengths of the resources they may encounter in the field. In this way, they should be able to weigh the pros and cons of any resource and thereby justify its continued use or why its use should be discontinued.

Case studies could prove helpful in getting students immersed in the type of thinking required as a decision-maker. In particular, attention should be paid to the *effect* and link it to the *cause*.

Characteristics of information must be taught. Students can be given certain real-life situations that are driven by information (stock exchange, health care, education) and asked to describe the information required for each area.

Question 2

This question assessed candidates' understanding of the advances in the field of information technology. Candidates were also assessed on their understanding of various tools associated with computer

networking. Further, candidates were assessed on their understanding of productivity tools. The mean mark was 7.56 out of 25.

In Part (a), although some candidates were unable to identify how information processing and storage technologies have improved over the last ten years, many were able to identify improvement characteristics such as capacity and speed.

In Part (b), most candidates were unable to accurately outline the function of the networking tools provided.

In Part (c), some candidates were unable to appropriately identify application software for the scenarios provided. In cases where candidates offered the correct application software, they were unable to offer adequate justification.

Recommendations to Teachers

Teachers should explore with students the development of technologies and identify trends, focusing on teaching all topics in a given module. Networking elements should be explored and students should be encouraged to develop a handbook of critical tools and their features and functionalities. Teachers should use scenarios and case studies to explore the application of software to information technology solutions.

Section II: Information Technology Systems

Question 3

This question assessed candidates understanding of the components of an information system and their functions. Candidates were also assessed on their understanding of types of software and the concept of data warehousing. The mean mark was 6.64 out of 25.

Part (a) was fairly well answered by most candidates. In Part (b), some candidates experienced difficulty discussing the relationship between operating system and application software. Further, candidates were not able to identify the relationship between the functions of the operating system and that of the application software and how the two types of software interact.

In Part (c), some candidates struggled to discuss how a data warehouse could benefit an organization even though they demonstrated an adequate understanding of what a data warehouse is. For Part (d), candidates had difficulty describing the different categories of software. In particular, candidates were unable to describe open source and proprietary software.

Recommendations to Teachers

Teachers should explain to students the meaning of various terms such as *identify*, *outline*, *relationship* and *describe*. They should also explore all topics in more detail and ensure students understand the various concepts.

Question 4

This question assessed candidates' understanding of concepts associated with computer networks and the internet. The mean mark was 10.14 out of 25.

In Part (a), candidates generally provided responses that were too vague and not specific to authentication and encryption. In Part (b), candidates struggled to offer an adequate discussion on a technology to assist the visually impaired access their electronic mail. For example, candidates stated Braille without offering a full discussion on how Braille could assist with the access to mail.

In Part (c), some candidates were not able to correctly provide the full meaning of the acronyms, while Part (d) was fairly well done. However, some candidates confused a domain name with a URL.

Recommendation to Teachers

Teachers should assist students with the development of a study guide that outlines and describes important concepts in the syllabus. Students should pay attention to the number of marks allocated to a question and be guided accordingly in their response.

Section III: Information and Problem Solving

Question 5

This question assessed candidates' understanding of extraneous and essential information as well as the survey as a tool for collecting data. In addition, candidates were required to demonstrate their understanding of criteria for accepting information. The mean mark was 17.07 out of 25.

In Part (a), some candidates did not follow instructions and simply stated Yes or No. In cases where candidates attempted to justify their responses, the statements were inappropriate or vague.

In Part (b), although some responses were not properly worded, most were good. Part (c) was poorly answered. In many cases candidates explained what a problem definition and a problem solution were, instead of referring to the given scenario.

Recommendations to Teachers

Teachers should work with students on similar questions to identify the critical elements required in responses and to help students respond appropriately.

Question 6

This question assessed candidates' understanding of programming paradigms, constructs and algorithms. The mean mark was 10.81 out of 25.

Part (a) was generally well done. However, candidates were not able to identify properties of well-designed algorithms. Part (b) was fairly well done. However, while candidates were aware that iteration involves repetition, several of them were unable to accurately state what would be repeated. Several candidates responded by saying that iteration involves the 'algorithm' repeating. Some candidates were unable to describe how the various programming control structures work.

Part (c) was well done by some candidates. However, many candidates excluded steps and there were many occasions where candidates confused the problem solving steps and Systems Development Life Cycle stages.

Part (d) was fairly well done by some candidates. However, while for the most part they were able to explain that programs are written using objects, they were unable to explain how these objects would be utilized in the program.

Part (e) was well done by most candidates. However, some candidates only stated what was calculated in the algorithm but were unable to explain how these calculations were performed. A few candidates also indicated that ‘variables’ were inputted into the algorithm. In addition, some candidates only gave the average obtained without showing how they arrived at their solutions.

Recommendations to Teachers

Students should be given a set of algorithms to critically analyse how well they are able to solve the problems for which they are designed. They should be required to describe the operations of a range of algorithms that cover various programming constructs.

Further, students should be introduced to and encouraged to do additional reading on the style of programming used in the various programming paradigms.

Paper 031 – School-Based Assessment (SBA)

This project enabled students to demonstrate their skills and competence in using information Processing Systems to assist them in developing a solution to a problem.

Students, with guidance from their teacher/tutor/supervisor, should be encouraged to identify a problem in their environment (school or home). In contrast to 2014, most students clearly defined a background to the problem. However many teachers were lenient and awarded marks that could not be justified at moderation. Teachers are therefore encouraged to follow the guidelines of the mark scheme as closely as possible. While improvements were seen in the reports, there are still critical weaknesses in some major sections of the project. The following sections highlight some of these weaknesses and offer recommendations that may be used to address them.

Problem Definition

Students who scored poorly lacked clarity in how they presented the problem statement. Students

- highlighted multiple problems and were therefore unable to define the scope of their solution
- stated the causes of the problem in this section, instead of the effects the problem have on the organization or individuals
- included solutions in this section of the report.

Recommendations

In defining the problem, students should develop a clear and concise problem definition that is limited to two or three sentences and includes one clearly defined problem, the person or organization affected, the reason for the concern and the effect on the person or organization.

Gantt Chart

The presentation of Gantt charts showed improvement over 2014 as more students were able to produce Gantt charts which included all stages of the problem-solving process, from analysis of the problem to justification of the solution. Although a table design showing successor and predecessor tasks may be useful, marks were awarded solely for representation of the required tasks with the use of the Gantt chart.

The following were observed in projects in which students scored poorly:

- Presentation of unrealistic timelines. For example, it is very unlikely that the three data collection methods can be employed and analysed in less than one week or that an observation would be completed in one day.
- Use of inappropriate units of measurement which made it difficult to determine the length of a task.
- Use of a table format instead of a chart.
- Incorporation of implementation and review sections, which are not a part of the requirements for the project.
- Combination of tasks.
- Exclusion of important tasks.
- Drawing of axes that were not clearly or correctly labelled.

Recommendations

Students should be encouraged to:

- Use the required productivity tools to produce the chart instead of manually drawing it.
- Create Gantt charts that provide a true reflection of the life of the project, including the documentation stage that deals with the actual printing, compilation and binding of the project.
- Use appropriate units of measurement on the Gantt chart, which are clearly defined and consistently applied across tasks.
- Include the Gantt chart as a section in the main project and not in the Appendix.

Analysis of the Problem

Students were able to identify and use fact finding techniques outside of the traditional techniques, as well as gather the data by using the appropriate tool. Most students effectively used the observation technique by reporting multiple visits. Some students listed advantages and disadvantages of using the tool or gave a definition/description; while this is not a requirement of the project, no penalty was incurred because of its inclusion. The majority of students was unable to score full marks for this section for one or several of the following reasons:

- The questions asked were leading questions and students were therefore unable to interpret the information to show the problem. For example, when looking at an operational inefficiency, many

questions were of the form ‘Do you think that an automated system would speed up this process?’ A more meaningful question may be ‘What do you think is the main cause of these long lines?’

- It was seen that of the three fact-finding tools used, not all pointed to the cause(s) of the problem.
- Development of the analysis was based primarily on one tool rather than the three tools being used.
- The questions chosen for the interviews and questionnaires were not always relevant to the SBA and very often added no value to the analysis.
- Some students did not interpret the findings obtained from the fact-finding tools and as a result the cause(s) of the problem were not sufficiently established.

Students who received full marks showed the causes that led to the effects that the person or organization was experiencing, with appropriate use and analysis of three fact-finding techniques.

Recommendations

Teachers should provide guidance in the structuring of questions for questionnaires and interviews, and checklists for observations. Students should only include graphs where appropriate. For example, it is unnecessary to provide a pie chart to summarize the responses to a question requiring a yes or no answer.

Students are encouraged to properly analyse the possible causes, utilizing the data tools to gather information on the causes for future interpretation, rather than approach the data capturing techniques with preconceived ideas of how the problem should be resolved. Students should avoid recommending solutions at this phase of the SBA.

Identification of Possible Solutions

Students who scored partial points or no points in this area did the following:

- Listed solutions without supportive details.
- Suggested solutions of similar nature without explanation of the differences. For example, many students suggested a DBMS and a spreadsheet as their solutions without a detailed explanation of how they would be utilized.
- Suggested solutions that only solved specific parts of the problem and not the problem in its entirety.
- Identified non-IT based solutions. Images or graphics of hardware and software are not suitable solutions.
- Listed only software solutions.

Recommendations

Solutions identified should be relevant and realistic to the problem and describe a complete IT-based system. For example, a barcode reader is a hardware component of a point-of-sale system and therefore, cannot be accepted as a solution. Ideally this section should include a brief description of the features of each suggested information processing system, showing how they will solve the problem. The features to be considered are:

- Procedures
- Personnel and end users
- Network technology (if any)

- Software alternatives
- Hardware alternatives

Evaluation of Possible Solutions

This component required that students objectively evaluate two or more identified solutions. In the evaluation of a solution, it is expected that students will pay attention to issues that may arise from the implementation of each proposed solution. The following were observed among students who scored poorly on this section:

- Failure to describe all the elements that may be associated with a particular solution (besides hardware and software elements) which resulted in the exclusion of elements such as *cost, personnel, training, reliability, time for development and implementation, environmental effects, security and maintenance*.
- Inclusion of a comparison of the solutions which is not appropriate for this section.
- Inclusion of advantages and disadvantages of the solutions *only*, which is not appropriate for this section.
- Failure to show the relevance of the attributes/criteria being evaluated. For instance, in terms of measurements, students failed to show what constitutes high, medium, low, and why a certain rank was selected.
- Evaluation of solutions that were *not* identified previously.
- Proposing more than one solution but only evaluating the one they believed to be the most feasible.
- Presenting only pictures of the hardware components of their identified solutions, which was inadequate.

Recommendations

Students are expected to evaluate all identified solutions. All the necessary elements as they relate to their implications on the economic, social, political, technical, operational and schedule feasibility for the organization or individual should be examined. Students should elaborate on the elements and the weights assigned to each, and the reason for that assignment.

Selection of Solution

Solutions should be limited to *only* two. Students were awarded full marks in this section if they identified two unique IT-based solutions and further selected one of those solutions. No marks were awarded if they selected a solution that was not identified in the Identification of Possible Solutions section or if a manual solution was chosen. This year more students were able to select an IT solution compared with previous years. Partial marks were awarded if

- only one solution was identified in the Identification of Possible Solutions section
- two software solutions were identified without explanation
- one of the solutions identified was a manual solution.

Recommendations

Students should refrain from joining this section with the Justification of Solution since an important component of the project is clearly identifying the solution.

Justification of Solution

Generally, most students performed poorly in this section. This component required students to thoroughly analyse the issues related to the implementation of the chosen solution, propose strategies for dealing with the issues, and provide an appropriate justification for all the strategies recommended. Many students repeated information from the evaluation section as justification. However, some students identified issues pertaining to the implementation of the solution, and used SWOT (strengths, weaknesses, opportunities and threats) and cost-benefit analyses. Students who scored poorly

- discussed strengths of the solution only, without adding issues that may arise from its implementation
- did not provide any strategies for handling the issues identified
- did not do any comparison to show why the solution chosen was better than the one(s) rejected in relation to solving the problem identified
- listed advantages and disadvantages of the solution without explaining the applicability to their choice.

Recommendations

While students utilized SWOT analysis, the elements of the SWOT needed to be developed more to justify the solution chosen. The suggested strategies should provide a clear indication of how each identified issue will be mitigated or eradicated. Please note that issues within this section relate to concerns that would result from an implementation of the solution. Students should also defend the chosen solution over the other solutions identified if the other solution(s) appeared to be a better choice.

Presentation and Communication of Information

This section required students to present their report in a format and style to meet the minimum standards of papers for academic purposes. Most students provided headings and subheadings throughout the document. While not included in the criteria being tested, it is expected that students will communicate their findings using correct grammar and utilizing the spellcheck feature found in most word processors. Many students did poorly in this section for a number of reasons including the following:

- They did not present an abstract or the abstract was inappropriate.
- References were either missing or not in a proper MLA or APA format.
- Some of them had a table of contents but page numbers were missing or page numbers were present but the table of contents was missing. Some page numbers were written in pen/pencil.
- Some of them presented a table of contents but the page numbers within the document did not correspond to the page numbers of the table of contents.
- Inconsistencies in font style, size and spacing.
- The cover page was incomplete.

Recommendations

If questionnaires, interview questions and charts are placed in the appendix they should be referenced in the body of the document. Today's word processors include a wizard to create a table of contents

with different levels corresponding to headings and subheadings. Students should be encouraged to use this wizard. The abstract should only give an overview of the requirements of the project and not a description of the solution. Since the report is in print, it is expected that the page numbers be in print as well.

The cover page should include the following:

- Title
- An appropriate graphic
- Name of candidate
- Candidate number
- Territory
- School name
- Center number
- Year of exam

Paper 032 –Alternative to School-Based Assessment (SBA)

This paper is provided for those candidates who have registered as private candidates. The paper consists of three equally weighted, related questions, which reference a research paper the candidate should have prepared over the year. The paper attempts to mirror the SBA in the questioning and the reporting of scores.

From the responses marked, it was evident that candidates either did little to no research or that they had no proper guidance in doing their research. Since the questions are related, a poorly defined problem will carry over into the other questions and since the paper attempts to mirror the SBA, the assessment of the paper also mirrors the moderation of the SBA. For example, under the section Identification of Possible Solutions to suggest ‘use a spreadsheet’ and ‘create a database’ are counted as one software solution in the moderation of the SBA and this thinking was also applied to the assessment of this paper.

Question 1

This question required candidates to write a problem statement, discuss possible causes of the problem, identify data gathering tools and their strengths and weaknesses, and different stages in the problem-solving phase.

Many candidates identified a problem that was beyond the scope of the syllabus. Most candidates were able to name the required data gathering tools. However it was noted that while they could select the best data gathering tool for a specific purpose, candidates could not say why this was the best tool to be used nor could they identify the shortcomings of the particular tool.

Question 2

This question, following on from Question 1, required candidates to discuss three possible solutions, evaluate the feasibility of each solution, and explain the benefit of identifying several possible solutions.

It was evident, from the quality of the responses, that candidates were not properly prepared to answer this question. Some of the possible solutions included training and an educational campaign. Many of them were not IT-based. Others had nothing to do with the problem identified.

In looking at the feasibility of proposed solutions, a majority of candidates seemed not to know of SWOT analysis and were, therefore, unable to provide an objective comparison of their proposed solutions. A majority of the candidates were able to say why it is advantageous to propose more than one solution to a problem.

Question 3

This question required candidates to select the most feasible solution, justify their selection; choose a second solution in the event the first choice cannot be implemented, justify the second choice; explain one disadvantage of the second choice over the first choice. They were also required to specify a means of compensating and to choose the most appropriate type of software to use to make a presentation to the class. Again, the question was not well done. Many of the solutions proposed were not IT based. The second part of the question was marked similarly to the first. For those candidates who may have proposed only one feasible solution, partial credit was awarded.

Most candidates were able to secure the two marks for the last section even though they named a piece of software and not the type of software as requested by the question.

Recommendations

It is recommended that candidates complete the tasks required, as guided by past papers, under the supervision of a competent tutor. Further, reviewing the comments written in the subject report on the School-Based Assessment would also prove beneficial.

UNIT 2

Paper 01 – Multiple Choice

This paper comprised 45 items, with 15 items per module. Most candidates performed satisfactorily. The marks on this paper ranged from 13 to 44. The mean score was 62.92 per cent.

Paper 02 – Structured Questions

This was the first examination where the paper consisted of six compulsory questions, two questions per module. The maximum score was 123 out of 150. The mean score on the paper was 63.37 per cent.

Section I: Information Management

Question 1

This question assessed candidates' knowledge of databases and database management systems. Candidates were also assessed on their understanding of different data access methods. The mean mark was 8.72 out of 25.

In Part (a), many candidates generally provided incomplete definitions of a database and demonstrated an inability to distinguish between database and DBMS. Most candidates were unable to identify a record in a database.

In Part (b), candidates were able to offer a distinction between sequential and direct access generally. However, in Part b (ii), many candidates were unable to identify examples of where sequential access was more appropriate.

Responses to Parts (c) and (d) were generally incomplete. Candidates were unable to define and distinguish between the different types of database models.

Recommendations to Teachers

Teachers should ensure students are able to illustrate concepts in practical terms, for example, sequential and direct access, object and hierarchical data models.

Question 2

This question assessed candidates understanding of database design and the application of structured query language (SQL) to extract specific information from a database. The mean mark was 6.75 out of 25.

Part (a) was not well in done in its entirety. There was evidence that candidates did not recognize the interconnectivity of the areas being tested. Candidates were generally unable to accurately draw an entity relationship diagram (ERD) and the incorrect use of symbols was noted in most cases.

The weaknesses identified were:

- Tables/entities were not named.
- Tables/entities were presented without primary keys.
- Inappropriate keys were selected for primary keys.

Candidates who answered Part (a) (iii) were able to get some credit. However, there were too many 'if...then' programming statements submitted and not enough actual SQL commands and statements.

Part (b) was generally well done. Most candidates were awarded for naming the validation strategy and outlining how it works. Many of them were able to say how the strategy works without naming it accurately.

Recommendations to Teachers

There is an obvious need for students to practise drawing ERDs. Students can be given systems from within their own environment (for example, the school library) to convert to an ERD. Further, students should be given more opportunities to design and implement their databases.

It must be noted that the number of responses where a ‘screenshot’ of the wizard was drawn was at a minimum this year. Teachers must be encouraged to continue with their efforts in teaching SQL.

Section II: Use of Information Technology Tools

Question 3

This question assessed candidates’ understanding of the application of information technology tools to the benefit of organizations. Candidates were also assessed on their understanding of various application software tools. Further, they were assessed on their understanding of information sources. The mean mark was 8.36 out of 25.

Part (a) was generally well done. Candidates were able to identify benefits of IT tools to organizations. Part (b) was well done. However, some candidates were unable to coherently state functions of the various application packages/software outlined. In Part (c), candidates were not clear on the appropriate uses of information sources and where they would be applicable.

Recommendations to Teachers

Teachers should promote discussions on the different types of information sources and where they would be applicable. They should also ensure that candidates are able to distinguish between types of information sources and examples of a particular information source.

Question 4

This question assessed candidates’ understanding of the World Wide Web. In particular, candidates were assessed on webpage development using HTML and various kinds of webpages. Candidates were also asked to demonstrate their understanding of an emerging technology in a particular context. The mean mark was 8.68 out of 25.

In Part (a), some candidates were generally able to identify some of the HTML tags required to build the component provided. However, many candidates did not accurately identify the correct HTML tags. For Part (b), candidates demonstrated minimum understanding of a web portal and a wiki. Candidates were generally able to define the term web-portal and had limited knowledge of a wiki-based webpage. However, they did not give detailed responses on the features of the webpage.

In Part (c), many candidates could not offer an appropriate emerging technology for the context presented. Candidates offered very general responses that were not appropriate for the problem provided.

Recommendations to Teachers

Teachers should ensure that students are exposed to webpage design using HTML tags and that they are provided opportunities to write HTML code. Teachers should also explore deeper understanding of the technologies in the syllabus as students are generally unable to go beyond a basic understanding of these topics.

Section III: Social, Organization and Personal Issues

Question 5

This question assessed candidates' understanding of computer crimes and the protection of privacy in organizations. Candidates were also assessed on their understanding of the impact of information technology on education. The mean mark was 17.38 out of 25.

In general, this question was fairly well done. However, in Part (a) (i), candidates identified computer crimes not related to university or college. In Part (a) (ii), most candidates did not refer to the computer crime and some responses were not properly worded although most candidates knew the strategies.

In Part (b), some responses from candidates were not properly worded and as such interpretation was difficult. Part (c) was answered fully in most cases.

Recommendations

Teachers should work with students to interpret and respond to questions based on computer crimes. Further, candidates need to use the marks allocated to questions to gauge the amount of information required.

Question 6

This question tested candidates' understanding of intellectual property, and health and safety issues associated with the use of computers. The mean mark was 13.36 out of 25.

In Part (a), many candidates were able to define the term *copyright* but were unable to identify differences between copyright and patents. For Part (b), candidates were able to define plagiarism and outline negative implications but were generally unable to provide adequate explanations of the negative implications. Part (c) was generally well done by most candidates.

Recommendations to Teachers

Teachers should encourage students to engage in making tables comparing terms like *copyright*, *patent* and *trademark*. Students need to be able to state and provide brief explanations for the consequences of plagiarism as well as for health and safety risks associated with computer use.

Paper 031 – School-Based Assessment (SBA)

Samples were submitted from a total of 62 centres across the Caribbean.

After moderating the submitted samples, the following observations were made, as it pertains to the quality of the samples that were received.

Overall, teachers' marking appears to be more in line with the standard expected by CXC. However, there are still cases in which the standard of marking was observed to be lenient. Consequently, the majority of the scores awarded was moderated lower than those originally given by teachers throughout the region.

Problem Definition

This section of the student's SBA is intended to display students' ability to give a complete description of the problem encountered by an organization, company or individual, in their environment of operation. From the samples moderated, it was clear that most students had not sufficiently mastered this skill, as only 15 per cent of them achieved the full mark for this section.

A clear description of a single problem is required by students in this section. Students should clearly define the scope of the problem and provide enough background information to show who is affected and how they are affected within their environment. Most students were able identify an organization/company/business/individual, inclusive of background information. However, they failed to describe the effect the problem had on the daily operations of these entities. Consequently, the majority of students lost their awarded mark (after moderation) because they did not clearly define one main problem that affected the core operation(s) of their studied organization, company or individual.

Although students were not penalized if they provided a discussion for their intended solution in this section, they were, however, not credited for doing so. Students ought to be mindful that this section should not give focus to the solution or methods available for solving the problem.

It is recommended that teachers use additional activities to explain the differences between the terms *cause* and *effect*, and guide students to highlight only the *effects* of a problem within their reports. Additionally, it is recommended that students refrain from merely giving a problem statement and that teachers assess students' reports, so as to award marks to students who clearly state one main problem while showing the effects the problem has on two or more tasks for the relevant individuals. Teachers should only award whole marks — fractional marks are not permitted.

Analysis of the Problem

This section of the SBA is intended to display students' ability to deduce one or more causes to the problem that was previously defined. Students are also required to present summaries of evidence from their investigations. Consequently, it is imperative that students deduce, from the given evidence, one or more causes that give rise to the effects of the problem within the operating environment of the studied organization, company or individual, so as to obtain marks in this section.

From the samples moderated, only ten per cent of the students achieved the full mark for this section. Moderation of the samples received demonstrated that a majority of students had little or no

development of the analytical skill that was required to conclusively prove that their cited cause(s) had/could have originated the effects of the problem. It was observed that most students presented summaries of findings that influenced their respondents to agreeing with their own estimation of a possible cause to their problem. For example, many reports presented evidence gathered from interviews, in which questions were formulated to illicit/lead the interviewee to students' desired response.

Where students submitted samples of the instrument used for their questionnaire, it was also observed that such students had a limited grasp of structuring such instruments to garner the supporting evidence so as to establish the causes for the problem defined. Two other trends were also observed. First, students sought to either give a description of the fact finding methods or their advantages and disadvantages, and second, they estimated or pretended to have found causes without sufficient information that would enable them to be sure of being correct – no marks were awarded for this information. Students who were noted to have presented their findings through the use of bulleted points and/or tables were also unable to achieve any marks, as a thorough discussion was not present to clarify the evidence presented. Additionally, while attempting to show the inefficiencies in procedures, students were found to be using the method of observation; however, these students failed to show the cause(s) of the effects, as their explanations only iterated the said effects of the problem.

Although students were not penalized for their identification and explanation of the methodology/fact finding tools that they used to glean the facts, they were not credited for the same. However, it should be noted that it is valuable for students to identify the tools used for obtaining the data/evidence for analysis. It is recommended that students present demographic evidence only if it aids as data to lead to a cause of the effects of the defined problem. It is recommended that teachers use additional activities to help students create instruments that are unbiased, valid, and reliable so as to ascertain appropriate data for analysis. Teachers should encourage students to brainstorm for several causes, while applying the skills for accepting and rejecting data, to establish the cause(s) for the effects of the problem.

Identification and Justification of IT Tools used in the Solution

This section of students' reports assessed their ability to demonstrate competent skills in identifying and justifying all information technology tools that they used in constructing the entire solution (which comprises both report and solution sections). Specifically, students are assessed for their application of concepts learnt from Specific Objectives 3, 4, 5, 6 and 13 of Module 2.

From the samples moderated, students demonstrated a fairly good aptitude to both *identify* and *justify* all IT tools used throughout their solution. Consequently, this section of the moderated samples was considered to have been generally well done — 60 per cent of students across the region achieved a mark for this section.

It was observed from the samples that students were failing to identify the tools that were obvious, as evidenced by screenshots, charts, and files created, among others, in the solution that they submitted. Students likened the skill of *identifying* to that of *defining* and/or *listing* the software tools that they used throughout their entire solution — they were not awarded full marks, as it was expected that they would have described briefly all relevant features/components of each IT tool, so as to demonstrate mastery in the skill of identification.

Additionally, students' samples affirmed that their understanding of the skill of *justifying* was likened to that of *stating* and/or *evaluating*; such candidates also lost a mark upon moderation, as they were expected to explain the correctness in using the identified features/components as a means of solving the cited problem, as opposed to explaining their purpose or comparing for efficiency or effectiveness. Few students were also not awarded marks after moderation, as their submissions were noted to have neglected justifying and identifying the tool that generated their report. It is vital that students understand that their report section forms an integral aspect of the solution, since it details the analysis of causes and implications of the user's product.

Students were not penalized in cases where they stated required hardware components or human personnel; they were also not credited for such statements. Teachers are being reminded to award marks, based on the mark scheme for this section, only for the tools that students are exposed to, for the said objectives. Additionally, teachers ought to bear in mind that students must present both the identification and justification of an IT tool before awarding one mark. Another concern was that students interchanged the terms database management systems and web authoring tools with *database* and *website*, respectively; teachers should aim to dispel this notion, as the latter is the end product of the former (which are IT tools).

It is recommended that students ensure that there is adequate identification and justification for the IT tool that creates the end product that their users will primarily interface with, and the IT tools that aided in completing their report. We also recommend, for developing the mastery of identifying and justifying IT tools, that teachers engage students in additional activities to cite where and how IT tools are used throughout today's society — with attention to features that make the software exclusive to the observed case. Amidst the fact that teachers ought to provide assistance to their students, teachers are being encouraged to allow candidates to express their own individualities in completing this section. Students should be guided to identify the IT tools they will be using in their solutions and indicate how the tools will be used to solve their identified problem.

Assessment of the Implications of the Solution

A critical assessment of the solution is expected to be given by all candidates, following the development of their solution. Subsequently, this section of the candidate's report assesses their mastery of key concepts studied in Objectives 1, 2, 3, 4, 5, and 6 of Module 3. Students are also expected to cite and discuss social, personal, or organizational vulnerabilities, which are unavoidable upon the deployment/use of the end product that they created. Additionally, this section assesses students' ability to apply their knowledge to a conceptualized/theoretical, if not factual, scenario where three or more likely consequences must be addressed for their solution to be effective. Consequently, students' mastery of applying knowledge from Objectives 7, 8, 10 and 12 of Module 3 must also be demonstrated in this section.

Moderation of the samples revealed that 30 per cent of the students achieved the full mark for this section, while 50 per cent scored one or two marks. Moderation of the samples received also indicated that teachers were lenient in adherence to the mark scheme for this section. Students showed a moderate grasp, in general, when presenting issues that their solutions would make apparent; however, such candidates only scored one mark for this section, as they failed to provide any resolutions to the issues they raised. Students were awarded a mark of zero where their responses were insufficient in showing how the issues would manifest if their solution were to be used in solving the problem. Students were moderated to a score of two, where despite providing a thorough discussion of three or more issues, they

were unable to present strategies that would lessen, if not mitigate, the effects of all issues they had raised.

Throughout the moderated samples, few students indicated that they were aware and proficient in prescribing appropriate strategies for issues — this is a commendable trend. Additionally, some of the reports revealed that there were greater efforts to remodel general strategies. A point worth noting is that, whilst there are favourable implications that may be cited, students are expected to dedicate their attention to implications that may have adverse effects.

When assessing reports for future students, teachers ought to bear in mind that this section has two components: a discussion of issues that may affect the entity (a maximum mark of 1), and a discussion of the strategies for all cited issues (a maximum mark of 2). Teachers should be cognizant that fractional marks are not permitted, for example, 1½. To achieve the maximum allotted mark, it is recommended that students discuss at least three issues relevant to the nature of the entity they are studying, while also discussing strategies of how the said entity can prevent or deal with each issue that may arise.

Solution – Implementation of the IT-Based Solution

Appropriate Use of IT Tools

Bordering on the assessment of students' entire solution, the mark awarded for this section is intended to reflect teachers' judgement of whether or not students have appropriately used all identified IT tools. Hence, for this section, the score presented on students' cover sheet (FRM/EDPD/211) indicates that teachers have assessed and found that the students have or have not utilized the significant features of all identified IT tools.

Despite the fact that there were a few instances where teachers incorrectly assessed students for this section, 65 per cent of the samples that were moderated showed that students had given diligent consideration in using the features of all identified IT tools. Consequently, these candidates were noted to have obtained the allotted mark for this section, after moderation. There was an exceptional improvement in the website solutions presented as the end product for users — this is commendable, as it showed that students are utilizing the relevant features of the web authoring tool to design a website for the specific situation. However, there were a few websites that made attempts to solve problems such as inventory management, information retrieval and timetabling. Teachers need to properly guide students to identify the apt tool to design the correct end product for a given problem.

It should be noted that although students were not penalized for being verbose in their reports, by dedicating a written section for this assessment, it was redundant and contributed no credit towards their score. Preferably, students should be encouraged to explore and apply advanced features of the IT tools that they will use to create the end product — especially in the instances of databases, which were often basic and comparable to competencies for CSEC students. We recommend that teachers accurately examine the reports of students to ensure that the features of a word processor, such as generating table of contents, reference pages and page numbers; applying line spacing and indentation; as well as inserting in-text citations, are appropriately used, when awarding the mark.

Human Computer Interface

Students are expected to design a software interface. Depending on students' chosen IT tool to implement the end product as a solution, the human-computer interface (HCI) is expected to allow students' intended users to interact with computers, with the aim of progressing towards their goal. This section of the SBA, therefore, assesses the extent to which the software interfaces have or have not been developed for successful interaction as well as how students design the interface for users to quickly learn and use the solution for their own productivity.

From the samples moderated, at least 80 per cent of the students were achieved the full mark for this section. Moderation of the samples demonstrated that the majority of students had a good grasp of key concepts and skills to competently develop a working HCI. Initial observation of students' HCI revealed that greater efforts were placed on ensuring that users were capable of quickly learning the functionality afforded by their interfaces. This was evidenced by students who provided help features and/or annotations to their buttons and icons, while also logically arranging buttons/icons — this is commendable.

To achieve the full mark in this section, it is recommended that students provide a logical and user-friendly navigation, with appropriate labelling for their solution. For instances where a database is created, it is recommended that all forms provide accessibility to return to the previous form, if not an option to return to the main menu/switchboard. Additionally, upon closure of reports and queries, students must ensure that users are able to continue tasks from the previously accessed forms. For instances where a website is created, it is recommended that students appropriately label and include working buttons and links on each webpage and ensure that said button/icons are consistent in font size, style and colour. It is further recommended that where students are unable to submit a storage media with their end product, that screenshots of all forms used to create their HCI be properly displayed.

It is recommended that teachers use additional activities which give students exposure to the navigation styles that are being made requisites for such solutions in today's society. Teachers are encouraged to allow students time to research/interact with myriad websites/database menus.

Appropriate Use of Features of Tools

The assessment of this section checks that students' end products have utilized the said features they identified in their report section. It is expected that the mark awarded by teachers, shown on students' cover sheet (FRM/EDPD/211), indicates mastery of the skill that students demonstrated in putting to use the significant features from all identified IT tools. A point to note is that emphasis is primarily given to the application of advanced features (above CSEC IT proficiency) in creating the end product.

The moderated samples showed that at least 60 per cent of the students achieved the full mark for this section. They also demonstrated that the majority of students had a fairly good grasp of key skills to competently use the features to develop a working solution.

However, it was observed that the quality of end products was below that expected of students at an advanced level of study. As such, teachers were awarding full scores to students whose submission utilized most, if not all, features contained in the CSEC IT syllabus for database management.

It is recommended that teachers ensure that students submit a soft copy of the end product, if they are unable to provide printed copies. Specifically, students must provide screenshots, ER diagrams/schema notation and SQL code for database solutions, and screenshots, sitemap and HTML code for website solutions.

To assess this section, we implore that teachers check the solutions of students as follows:

- Students who have chosen a DBMS IT tool must utilize at least three tables (normalized to the 3rd normal form); employ validation rules for each table; create relationships among all tables, while enforcing referential integrity; create select, update, delete and append type queries; design required views for users utilizing forms; apply grouping, sorting and arithmetic operations to data being displayed for reports, while inserting logo and charts; use password/login feature; and use macros.
- Students who have chosen a web authoring tool must utilize hyperlinks (using relative links and absolute links, where needed); insert images and present data in tables and lists; use HTML form elements: radio, text and submit; use HTML media elements: video and audio; layout the webpage using *div*, *iframe*, *header*, *footer*, *section*, and *nav* tags, to name a few; as well as use HTML text formatting elements and attributes for example, style, h1.

Working Solution

This section is intended to show the mastery of key concepts, skills, and knowledge that students possess and used to develop the solution. The score obtained by students is based on teachers' assessment and judgement of students' ability to model a solution that their user requires. The majority of samples received moderated marks between three (inclusive) and six (inclusive). Additionally, it was observed that there were a few solutions that did not solve the defined problem. A few students lost a mark after moderation for instances where their hyperlinks were not working. Students with database solutions also lost the mark where their solutions only modelled relationships on tables, and no integrity checks or validation rules were enforced.

It is recommended that students who opt to use website solutions implement a navigational bar, which has the site's related links coded on all pages. It is also recommend that teachers/students ensure that the passwords implemented for their database solution is tested and made available in their submissions. All solutions must be submitted on a storage medium.

Paper 032 – Alternative to School-Based Assessment (SBA)

This paper is provided for candidates who have registered as private candidates or are unable to make the scheduled classes and wish to prepare themselves through self-paced study.

The paper consists of three equally weighted, related questions, which reference a research paper candidates should have prepared over the year. The paper attempts to mirror the SBA. This year the mean score was 23.09 out of a possible 60.

Question 1

This question required candidates to write a problem statement, discuss possible causes of the problem, identify data-gathering tools and state phases of the problem-solving process. Instead of limiting their responses to a succinct problem statement, most candidates provided unnecessary background information, while some candidates provided a problem and solution that was not IT based. An example of a good problem statement is: *The ABC High School requires assistance to reduce the occurrence of break-ins it has experienced in the last two months.*

Generally, candidates were able to provide an adequate discussion of the limitations of fact finding tools used. Most candidates were able to identify other steps in the problem-solving process. However, there were some weaknesses in candidates' responses. Candidates had problems writing an accurate and full description of the problem. In addition, approximately 50 per cent of responses relative to the problem statement did not lend themselves to proper IT solutions. This was reflected in candidates either scoring poorly or being unable to respond to Question 3. In addition, candidates found it challenging to provide a complete discussion for justification of fact finding tools used.

Question 2

Candidates were asked to identify elements of their computer system, that is, the hardware, software and users. Some candidates gave hardware components that could not be considered essential such as speakers. Similarly, some responses to software components were also inappropriate. An acceptable response must state the name of the category of software as well as list the specific features of the software.

In Part (c), where candidates were required to describe their solution in terms of its inputs, processing and outputs, they experienced challenges correctly identifying the inputs to their system. To use the camera as an example, *the inputs would be still shot or video of the perpetrator; the processing would be the compression technology used and the output would be a printed photo or a video on a memory storage card.*

In general,

- candidates ably identified components of hardware, software and users within an IT solution
- apt discussion, though not complete, was provided for the likely impacts of the implementation of solutions proposed.

However, some candidates did not provide a complete explanation of the solutions in terms of their inputs, processing and outputs.

Question 3

Very few candidates completed Question 3 satisfactorily. Candidates displayed little knowledge of entities, the entity-relationship diagram (ERD) or the structured query language.

Candidates struggled with the following:

- Constructing an ERD — attempted responses reflected more of a data flow diagram (DFD). Most candidates were able to identify entities only.
- Describing the ERD in terms of its cardinality among the entities and the labelling of relationships.
- Constructing correct and accurate SQL statements.