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.