CARIBBEAN EXAMINATIONS COUNCIL

REPORT ON CANDIDATES' WORK IN THE ADVANCED PROFICIENCY EXAMINATION

MAY/JUNE 2011

INFORMATION TECHNOLOGY

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.

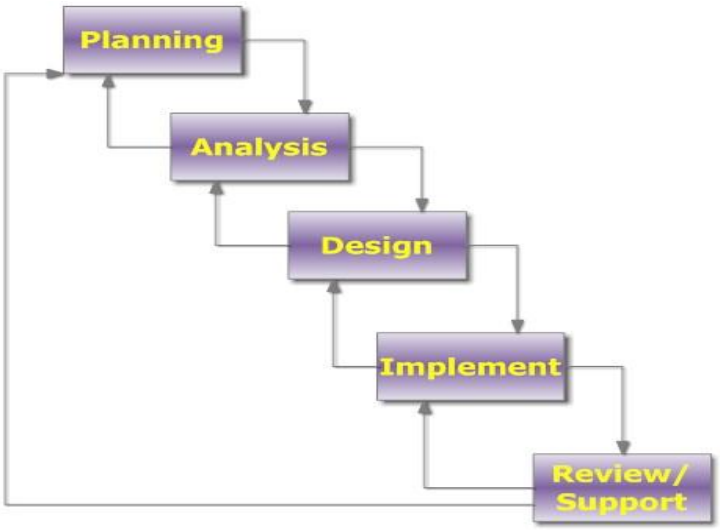
Question 5

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 sub-divide 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.

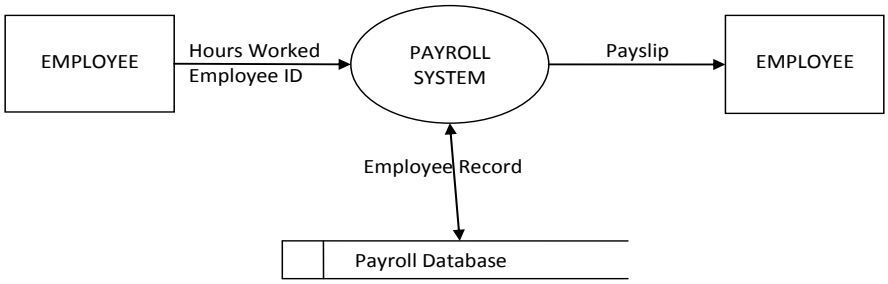
In Part (c), candidates were required to draw a context diagram for the payroll system described in the question. Many candidates included flow chart symbols in their responses, despite being provided with the symbols in Part (b) of the question. Candidates were required to adhere to the rules applicable 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.

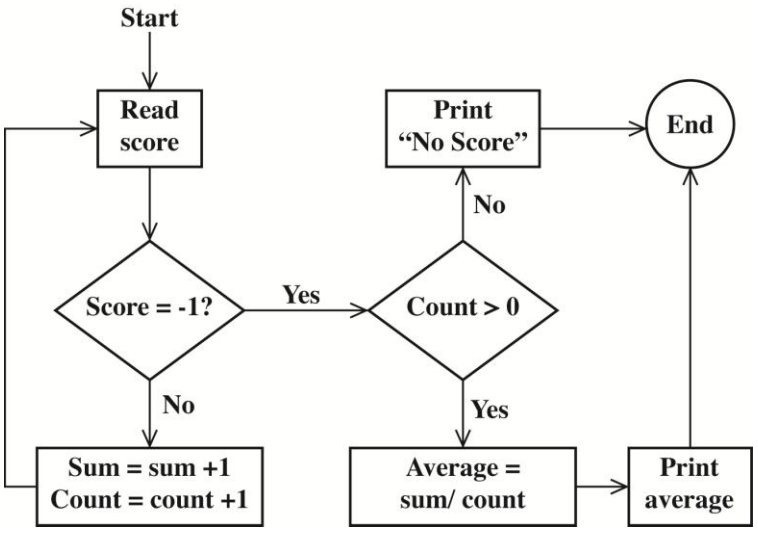
Question 9

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	○ Barcode	○ Cashier or Customer
One data store	○ Item ID	○ Item or Inventory Database
Two data flows	○ Total to be paid by customer ○ Cashier scans each item	○ Payment ○ 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 Issues

Question 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.