CARIBBEAN   EXAMINATIONS   COUNCIL

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

**COMPUTER SCIENCE
(REGION EXCLUDING TRINIDAD AND TOBAGO)**

COMPUTER SCIENCE

CARIBBEAN ADVANCED PROFICIENCY EXAMINATIONS

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INTRODUCTION

This is the eighth year of open examinations for Unit 1 and the fifth year for Unit 2. There were three examination papers in both units, namely, Paper 01, Paper 02, and Paper 03. In each unit, Paper 01 and Paper 02 were examined externally by CXC while Paper 03, the Internal Assessment, was examined by teachers and moderated by CXC.

In each unit, Paper 01 consisted of multiple choice questions that were designed to test candidates' breadth of coverage of the syllabus. On the other hand, Paper 02 consisted of essay-type questions that were designed to test their depth of understanding of the syllabus. Thus, candidates were expected to show deeper insight and understanding of the topics examined in Paper 02.

The individual contributions of Paper 01, Paper 02, and Paper 03 to the final grade remained 50 per cent, 30 per cent, and 20 per cent, respectively.

GENERAL COMMENTS

In general, performance on both units of the syllabus has continued to improve. In Unit 1, 80 per cent of the candidates obtained grades I to III. In Unit 2, 70 per cent of the candidates obtained grades I to III. However, the performance on the School Based Assessment should have been better. Better performances on the SBA would lead to better overall performances on both units as well as better performances on the theory papers. Candidates need to maximize the opportunity to get higher marks on the SBA.

Even though the performance in Unit 2 has improved, there is still concern about the level of programming ability being demonstrated in Sections B and C of both written papers. Candidates continue to find it extremely difficult to write even simple programs, in both the imperative and object-oriented programming languages. Teachers are encouraged to have several programming labs and exercises done with the candidates.

As recommended last year, candidates are encouraged, as part of their examination technique, to read questions carefully before answering, and to respond with sufficient detail that is commensurate with the marks indicated in the question.

DETAILED COMMENTS

UNIT 1

PAPER 01

SECTION A – Components of Computer Systems

Question 1

This question tested candidates' knowledge of extranets, intranets, ROM, RAM, deadlocks and system software.

For Part (a) most candidates obtained only half of the allotted marks. They understood the difference between internet and extranet but they did not adequately differentiate between the two.

For Part (b) while the candidates were able to identify the importance of ROM and RAM, they confused both and as a result they mostly obtained half the mark. They did not adequately identify the software associated with each type.

In Part (c) most candidates obtained more than half the mark. Most answers showed that the student applied their knowledge appropriately and gave several responses that demonstrated a higher level of thinking.

Part (d) was generally well done but in some cases they were suggesting categories of software instead of giving precise examples.

Part (e) was poorly done. Candidates were unable to explain exactly what constituted a deadlock in computer terms. A possible explanation could have been that a deadlock refers to specific conditions when two or more processes are waiting for each other to release a resource. Candidates did not provide adequate examples.

Part (c) (ii) was poorly done. Candidates had a tendency to give definitions of an interrupt but were unable to explain how an interrupt is handled whenever it occurs in the operating system of a computer. A typical solution involves stating that the operating system saves the state of the current process, in execution, stores information related to the new process, runs the process and then restores the original register values in order to return to the execution of the previous process.

Part (c) was attempted by the majority of but many only obtained two marks out of four. A number of candidates provided file management utilities as well, and hence did not obtain full marks. A good response would mention fusing bad disk cluster errors and defragmenting.

Question 2

This question tested candidates' knowledge of

- The role of the OSI model during the transmission of a text file from one computer to the next
- HTTP, FTP, client/server and peer-to-peer as it relates to the internet

Part (a) was poorly done. Candidates were able to produce a diagram of the OSI model but showed little understanding of the workings of the model. Candidates were unable to explain the functions of each layer.

For Part (b), candidates were required to differentiate between 'HTTP' and 'FTP'. Most candidates wrote what they stand for instead of giving their functions.

A few candidates understood the concept of the approaches that can be used to share files over the internet for both client/server and Peer-to-Peer. Most candidates seemed not to understand that the client/server and Peer-to-Peer are two different network architectures and that the terms are not interchangeable.

Few candidates were able to explain that distributed network configurations are fault tolerant and that they have extensive processing power. Most confused the distributed network configuration with the centralised configuration.

SECTION B - Application of Computers

<u>Question 3</u>

Part (a) of this question presented a scenario and candidates had to discuss economic and social implications of using vending machines in a business. Part (b) of this question also presented a scenario and candidates had to suggest advantages of using computer applications to store customer records.

For Part (a) (i) and (ii). These parts were generally fairly well done. However, a number of candidates seemed not to know the difference between economic implications and social implications. Most candidates did not "Discuss" the implication.

For Part (b)(i) Most candidates were able to respond adequately to this part.

For Part (b)(ii) The majority of candidates were able to identify advantages of computer applications but did not go on to discuss these advantages and so were unable to gain full marks. The two main advantages identified were quick retrieval of data and easy boot up of data.

Responses to part (c) varied due to the fact that it was subjective. As a result, most candidates comfortably gained marks.

Almost all responses to part (d) identified two ways to control unauthorised disclosure but most were lacking when it came to the discussion.

The majority of candidates did not gain marks for part d (ii) because they failed to identify an additional strategy other than password or what was identified in d (i). A possible strategy is the use of remote biometric scan e.g. retina scan with remote validation.

<u>Question 4</u>

For Part (a) Candidates were required to explain what is meant by real-time updating of files in a computer application and outline one situation where this approach is necessary. This was well done by most of the candidates. However:

- Some candidates did explain what real-time updating of files is but failed to give any example where this approach to updating is necessary.

- Some candidates' definitions of real-time file update were incorrect. However, the examples given were correct and therefore candidates were awarded some of the marks.

- There were few candidates who did not understand the concept by the reflection of their answers which were totally inappropriate or incorrect.

For Part (b) candidates were required to explain the meaning of data loss, data corruption and unauthorised access as it relates to problems with the computer system at the retail store.

Most candidates did not explain what unauthorised access is, however, some candidates had problems differentiating data loss from data corruption and simply gave answers such as "Data loss as it suggests is loss of data in a computer system."

For Part (b) (ii) in each of the problems, candidates were required to suggest one way in which the computer consultant may have determined the existence of that problem. For data corruption if it could have been determined if the contents of a file were changed.

Some candidates redefined data loss, data corruption and unauthorised access, instead of showing how the consultant might have determined the existence of that problem.

For Part (c) (i) Candidates were required to describe two strategies that can be used to back-up critical data in a government organization that is located in a country in a region prone to hurricanes.

Most candidates just stated the two strategies and did not describe them and therefore could only gain a fraction of the marks awarded.

In Part (c) As a problem solving exercise, candidates were required to determine the steps required to be taken after a hurricane in order to restore the computer systems and data. A vast number of candidates made no reference to the problem solving steps but demonstrated their understanding of the step by the solution they provided.

SETTING - Computer based Problem Solving

Question 5

The majority of candidates scored between 20 and 30 marks. Part (a) was generally well done. Parts (b) and (c) sought to test candidates' appreciation of the qualities and characteristics of information and information sources; these parts were reasonably well done. For part (a) possible responses could have included:

(i)   It is much more convenient for readers to access articles from their office or home computers instead of having to wait on the mail or go to the library.

Readers have access to a wider range of articles at a very reasonable price compares to paper subscriptions or library subscriptions which are limited by cost.

(ii)   Managing subscription and distributing articles is more convenient with digital technology. Articles are placed in the library and readers only have to download articles from the library.

Publishers reduce time and cost by not having the traditional long delays of publishing. The articles are more attractive to read since they are less out-of-date by the time they are published online.

Question 6

This question tested candidates' depth of knowledge of database and spreadsheet applications software, architecture and usages.

Candidates would have had to read widely and pay attention to formulae to answer the question. Many candidates seemed to have relied on the auto sum function and were not current with the formulae.

UNIT 2

PAPER 02

SECTION A – Software and Software Development

Question 1

Part (a) of this question tested candidates' ability to draw a data flow diagram (DFD) and their understanding of the different features of the rules governing the creation of DFD's. Part (b) tested candidates' knowledge of the properties of well-engineered software. Part(c) tested candidates' knowledge of the advantages and disadvantages of evolutionary development over the waterfall approach.

A significant number of candidates attempted part (a) of the question but many candidates were not able to differentiate between a context diagram and a level-o diagram.

A context diagram is an overview of flow of information to and from the external entities to the system. The context diagram contains no data stores and only one process which is the system.

The level-o diagram contains more details and is a more detailed view of the context diagram. Here the flow of information between the external entities, data stores and processes are shown.

Candidates also had problems correctly labelling data flows where data flows were labeled using verbs rather than nouns and adjectives.

Many candidates seemed to have been exposed to only one data flow model and therefore incorrectly identified the error in the diagrams as being an incorrect symbol rather than the presence of a process in Figure and the absence of input to the process in Figure 1.

In Parts (b) most candidates did a very good job at discussing the two properties of well-organised software.

For Part (c) answers given by candidates, for one advantage and one disadvantage of evolutionary development over the waterfall approach were satisfactorily answered. However, some candidates ignored the word discuss and therefore were not able to gain full marks as they did not explain their points.

Question 2

In Part (a)(i), most candidates were unable to identify the two sources of information for drawing an ERD.

In Part (a)(ii), most candidates were able to construct a proper ERD. In some instances they were unable to establish proper cardinality and relationships. This was rare however. Few candidates drew a DFD instead of an ERD but were still able to identify the entities.

Part (b) which tested candidates knowledge of graphical over interface, was fairly well done by most candidates. However, there were instances where candidates tended not to answer the question within the context of the given scenario. Instead, they attempted to discuss general features of a user interface.

In Part (c), most candidates obtained 2-3 marks out of 6. This was due to the fact that they often gave three reasons why users and management needed to be involved in the development of a software product, which amounted to the same point. They mainly discussed the point that "managers and users are able to specify their needs", in different ways.

SECTION B – Programming Languages

Question 3

Part (a) tested candidates' ability to write on algorithm to reverse the order of the content of an array. Many candidates were not able to gain full marks, due to the size of the dataset. Candidates were able to give a specific solution rather than a general solution. They were not able to swap the elements from location 5 to 9 correctly.

Part (b) was also poorly answered. Candidates were unable to manipulate the indices of the given array. This followed the candidates in arranging even numbers to the front of the array and adding numbers to the back of the array. They were unable to write a proper statement determining whether an integer is odd or even.

Part (c) which tested candidates' knowledge of First and Second generation programming languages was generally well answered.

Part (d) was also well answered, candidates were able to identify control constructs in structured programming but were unable to give proper examples.

Question 4

This question tested the candidates' ability to:

(a)   manipulate predefined functions to produce desired output.

(b)   manipulate a list of values to produce the largest values using recursion.

(c)   apply programming languages to particular situations.

Part (a) was generally well done. Most candidates did not assign values to the parameters and output string.

Part (b) posed a great deal of difficulty for most candidates. Candidates focused on programming languages rather than what the applications created would be used for (cell phone and desktop computer).

In Part (c), most candidates did not attempt this part of the question. Responses reviewed showed limited programming skills and lack of knowledge of recursive functions.

Part (d) was generally well done by the candidates, but most were not able to fully explain how objects communicate by working methods on other objects to which they have no reference. A possible solution for part d (ii) is:

Objects communicate in an object oriented program by message passing. If an object, *A*, of a certain class needs to communicate with an object, *B*, of another class, it first obtains a reference to *B*. *A* then communicates with *B* by sending messages.

SECTION C – Program Development

Question 5

Part (a) of the question tested candidates' knowledge of graphical user interface objects. Candidates for the most part were able to identify correctly the different objects that were used, but many of them had difficulty explaining the purpose of the different GUI objects.

In Part (b) and (c), many candidates demonstrated that they were not aware of what an event is in Event Drives Programming. A satisfactory answer would include description of clicking the calculate button to trigger tax calculation, clicking the exit button to trigger exiting of the window or pressing the enter key in a text field. Simply typing words in a text field is not considered an event as the API would take care of this.

In part (d) (i) many candidates were able to distinguish between unit testing and system testing.

For Part d (ii) candidates were unable to outline the tests that could be performed to **unit test** the Account class. One of the test that candidates could have given is:

Create a new account with a certain balance. Invoke the **get balance** method right afterwards and ensure that the amount returned is the same as that used to create the account.

Question 6

Part (a) tested candidates' ability to write source code for a class in object oriented programming language, it also required candidates to declare instance variables of different data types and code two methods with simple functionality. Many candidates were unable to correctly write the code for *Employee* class. Some candidates did not know how to write an accessor, a method that simply returns the value of an instance variable.

In Part (b) candidates were expected to write a fragment of a code to perform a given test. The majority of candidates performed poorly in this question indicating that most of them are not getting adequate exposure to practical object – oriented programming.

Part (c) required candidates to explain how the *Manger* class could be derived from the *Employee* class. This was poorly done by candidates. Candidates could have stated that the easiest way to create the *Manager* class is to reuse the functionality of the *Employee* class by using inheritance to automatically have the instance variables and methods of *Employee*. In the subclass, additional instance variables such as secretary are simply declared as instance variables in the subclass. Additional functionality is implemented as new methods in the subclass, perhaps by overriding methods such as raise *Salary*.

PAPER 03

INTERNAL ASSESSMENT

GENERAL COMMENTS

The performance on the Internal Assessment was generally good. The projects submitted by some candidates were deficient in various aspects and were still being awarded high marks by teacher.

Teachers need to become more closely involved in the supervision of the projects.

Generally, most candidates chose appropriate topics for the Internal Assessment. The topics chosen were relevant to the level of the candidates' ability and the specific objectives of the syllabus. The treatment of the topics by candidates was adequate. A small percentage was comprehensive though some tended to be superficial. The reports were also generally well presented.

DETAILED COMMENTS

INTERNAL ASSESMENT

Candidates should make more of an effort to follow the layout given in the syllabus. This allows the candidates to clearly identify which parts of the SBA are being responded to. Teachers need to pay particular attention to the symbols that are used in the respective diagrams.

Teachers also need to ensure that the candidate's code is printed and included in the SBA response.

The use of an object oriented language in a non object-oriented fashion should be avoided. Marks are awarded for the use of appropriate classes and class method, thus the use of an object-oriented style of programming.

Few candidates are confusing and mixing functional and non functional requirements.

Any soft copy that is submitted should be given in CD format. Avoid using 3 ½ floppy disks.

There were a few cases where candidates used the old Unit 2 syllabus to prepare their internal assessment. As a result, irrelevant information was submitted.

In some cases, the functionality of the program written was poorly described and there were no screen shots of the working system producing stated functionality displayed in the reports. The scope of the programs was too large, thus the stated functionality seldom matched the actual program produced. Teachers should encourage their candidates to produce programs that focus on simpler more specific problems from the start, allowing candidates to realistically produce what is proposed in the early documentation.

RECOMMENDATIONS

(i)   A workshop review of the 2008 examination should be done in each school to assess and detail the concerns and challenges of candidates with particular topics.

(ii)   Schools need to carefully compare the new information technology syllabus with the computer science syllabus and decide which of these subjects to offer based on the resources they have available and the interests of students. Schools are advised not to offer computer science if adequate teaching resources are not available.