



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



CANDIDATES' ITEM RESPONSE ANALYSIS REPORT
ON THE ADVANCED CERTIFICATE OF SECONDARY
EDUCATION EXAMINATION (ACSEE) 2022

COMPUTER SCIENCE



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136 COMPUTER SCIENCE

Published by:

The National Examinations Council of Tanzania,
P. O. Box 2624,
Dar es Salaam, Tanzania.

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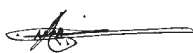
FOREWORD

The National Examinations Council of Tanzania is pleased to issue this Candidates' Item Response Analysis (CIRA) report on Computer Science in the Advanced Certificate of Secondary Education Examination (ACSEE) 2022. The analysis aimed at providing feedback to students, teachers, parents, policy makers and other education stakeholders on how the candidates responded to the questions.

Generally, the candidates' performance in the 2022 Computer Science Examination was weak as only 22.15 per cent of the candidates passed. The analysis of performance on each topic shows that the candidates had good performance on one topic, average performance on four topics and weak performance on five topics. The candidates performed well on the topic about *Information System*. The candidates' performance was average on the topics *off* and *Environment*, *Website Development*, *Visual Programming* and *C++ Programming*. The performance was weak on the topics on *Data Communication* and *Networking*, *Data Representation*, *Computer Security and Privacy*, *Problem Solving* and *Computer Basics*. The weak performance on these topics was attributed to the candidates' lack of practical skills, failure to understand the questions' demands and weak mastery of the English language.

The National Examinations Council expects that the feedback provided in this report will help the education administrators, school managers, teachers and students to identify proper measures that need to be taken in order to improve candidates' performance in the future examinations administered by the Council.

Finally, the Council would like to thank all examination officers and all other stakeholders who participated in the preparation of this report.



Athumani S. Amasi
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report presents an analysis of the candidates' performance on the Advanced Certificates of Secondary Education Examination (ACSEE) for the Computer Science subject in 2022. The examination assessed knowledge and competences acquired by the candidates at the Advanced Level of secondary education.

The examination had two papers, Computer Science 1 (Theory) and Computer Science 2 (Practical). The theory paper had 2 sections; A and B. Section A consisted of 7 compulsory questions of 10 marks each. Section B had 3 optional questions of 15 marks each. The candidates were required to attempt 2 questions. The practical paper had 3 questions of 25 marks each. The candidates were required to attempt 2 questions, including question one.

A total of 298 candidates sat for the Computer Science examination in 2022. Out of these, 66 (22.15%) passed the examination and 232 (77.85 %) failed. In 2021, a total of 310 candidates sat for the Computer Science examination, of these candidates, 187 (60.52%) passed and 122 (39.48 %) failed. This means that there is a decrease in performance by 38.37 per cent in 2022.

The analysis of the candidates' performance on each question is done by showing the requirements of the questions, what the candidates wrote and the mistakes they made while attempting the questions. Furthermore, the extracts of candidates' responses have been provided to illustrate the cases presented. The candidates' performance on each question/topic is categorized using the ranges of 0 to 34 (weak performance), 35 to 59 (average performance) and 60 to 100 (good performance). These intervals stand for the percentage of the candidates who scored 35 per cent or above of the marks allocated to different questions. The candidates' performance is also presented in different charts in which the red colour stands for weak performance, the yellow colour for average performance and the green colour for good performance. Finally, the report presents conclusions and recommendations.

2.0 ANALYSIS OF THE CANDIDATES' RESPONSES PER QUESTION

2.1 136/1 Computer Science 1

This was a theory paper whose duration was 3 hours. The paper consisted of sections A and B, with a total of 10 questions. Candidates were required to answer a total of 9 questions weighing 100 marks in total.

Section A consisted of 7 short-answer questions. Candidates were required to answer all the questions. Each question carried 10 marks, making a total of 70 marks in this section.

Section B consisted of 3 essay/structured questions. Candidates were required to answer 2 questions. Each question carried 15 marks, making a total of 30 marks.

2.1.1 Question 1: Computer Basics

In this question, the candidates were required to read the given paragraph, and answer the questions that followed. The question read:

The headmaster of a certain school assigned you task to create a school database that will store a record of students' information using Microsoft access. The database should be featured by a friendly user interface that restricts unauthorized access to information.

- (a) Explain the feature you would use to design a friendly user interface.
- (b) Describe the steps you would use to create the feature in part (a).
- (c) Explain three data security tools that can be applied to enforce security in a school database.

A total of 298 (100%) candidates attempted this question, out of whom 284 (95.30%) scored 0 to 3 marks and 14 (4.70%) scored 3.5 to 5.5 marks out of 10 marks allocated. There was no candidate who scored 6 to 10 marks in this question. Figure 1 illustrates the candidates' performance on this question.

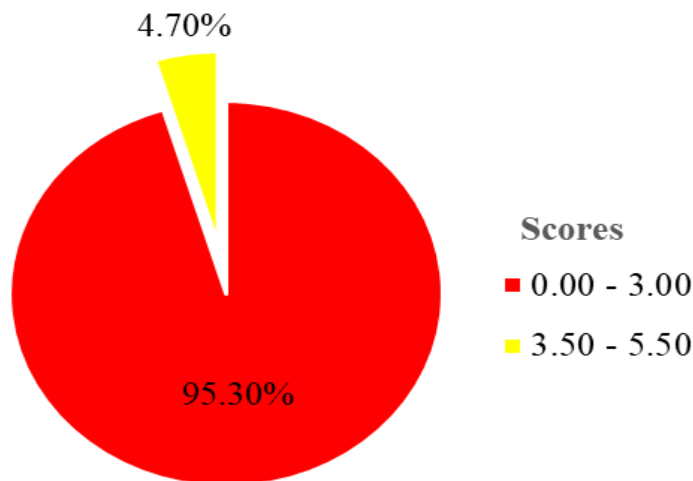


Figure 1: *The Candidates' Performance on Question 1 of Paper 1*

The general performance on this question was weak because 95.3 per cent of the candidates scored below 3.5 marks. Most of the candidates who scored low marks mentioned general features of Microsoft access database such as table, form and query instead of explaining the features required to restrict unauthorized access to information which includes macros, switchboard and VBA (Visual Basic for Application) in part (a). Some of the candidates explained Microsoft access while others explained Structural Query Language (SQL) as features to restrict unauthorized access. This signifies that the candidates did not understand the question. In part (b), some of the candidates described the steps of creating a table, a form or a query instead of macros, switchboard or VBA. Other candidates wrote the steps to open Microsoft access. This indicates that the candidates lacked knowledge about Microsoft access features and their applications. Furthermore, some candidates wrote about steps of system development such as problem identification and requirement specification. This made them to score zero mark in this part. In part (c), most of the candidates managed to mention at least one data security tool but failed to give its explanation. Some of them explained correctly only one tool but failed to explain other tools. Other candidates wrote about methods of protecting a computer against virus such as avoiding sharing of materials, avoiding downloading data from unsecured sources, etc. This shows that the candidates failed to distinguish between data security tools and

measures used to protect a computer against computer attacks. Extract 1.1 represents a sample of an incorrect response to question 1.

| | |
|-----|--|
| (a) | Microsoft database access. |
| (b) | 1 st step Press the cursor to the microsoft database access in order to open the program. |
| | 2 nd step Choose by using cursor on the word written as database |
| | 3 rd step By using cursor press home tab in order to find form and then write data given which includes names which are in form of first name, middle name and the last name and other requirements needed in data base access. |
| | 4 th step Go to home tab and then press the cursor to form after that the details will displayed to that form. |
| | 5 th step Save your written information in microsoft database access. |
| | 6 th step The record of student's information will be displayed to Microsoft database access. |
| (c) | → Create a strong passwords which is not known by everyone. |
| | → Close the program after using it |
| | → Avoid sharing of computers that can cause data security to become broken. |

Extract 1.1: A sample of incorrect answer in question 1 of paper 1

In Extract 1.1, the candidate wrote an incorrect application software instead of explaining one of the features that design a friendly user interface in the Microsoft access in part (a). In part(b), the candidate

described incorrect steps to create the feature as explained in part (a). Furthermore, in part (c); the candidate listed only one data security tool without providing explanation.

Some of the candidates (4.70%) who scored average marks gave the correct features required to design a friendly user interface but failed to explain them in part (a). Other candidates explained form control features applied on Microsoft access instead of the features required to restrict unauthorized access. For example, one of the candidates explained *User Id*, *UserName* and *UserPhoneNumber*. This shows that they did not understand the question. In part (b), some of the candidates described correctly only one step used to create automated features to restrict unauthorized access but failed to explain other steps. This made them fail to score full marks in this part. Other candidates wrote the procedures of designing database instead of procedures to create automated features of database. This shows that they failed to understand the question. In part (c), most of the candidates explained correctly only one data security tool but failed to explain other tools. Some of them gave three correct data security tools but failed to explain them. A few candidates explained correctly two tools with an incorrect explanation on one security tool. This made them lose some marks. Moreover, some of the candidates wrote data security principles instead of data security tools. For example, one of the candidates explained on *data integrity*, *data privacy* and *data confidentiality*. This signifies that the candidate failed to understand that these three principles depend on data security tool.

2.1.2 Question 2: Data Representation

In this question, the candidates were required to:

- (a) explain, why is it more efficient for a computer to use hexadecimal number system instead of binary number system for data representation? By giving two reasons.
- (b) simplify the Boolean expression $F = XY + XYZ + XY\bar{Z} + \bar{X}YZ$ and to draw its logic gate;
- (c) illustrate how AND gates can be derived from NOR gate using logic gate circuit diagram.

A total of 298 (100%) candidates attempted this question, out of whom 243 (81.54%) scored from 0 to 3 marks, 29 (9.73%) scored 3.5 to 5.5 marks and 26 (8.73%) scored 6 to 10 marks out of the 10 marks allocated. Figure 2 illustrates the candidates' performance on this question.

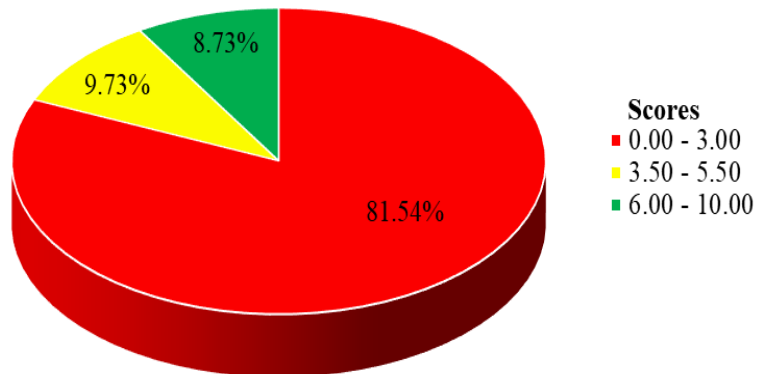


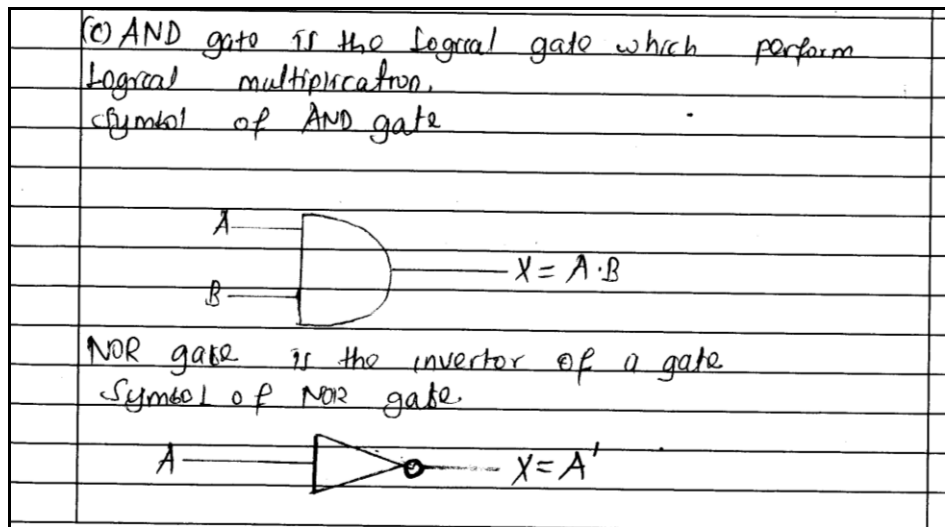
Figure 2: *The Candidates' Performance on Question 2 of Paper 1*

The general performance in this question was weak because 81.54 per cent of the candidates scored low marks (0 - 3). Most of the candidates (81.54%) who scored low marks differentiated hexadecimal from binary number system instead of giving reasons as to why hexadecimal is more efficient than binary number system in part (a). Some of them differentiated hexadecimal from binary number system by relating them with the computer programming language. For example, one of the candidates wrote; *Hexadecimal is simple to understand in programming language, also it is short and easy to find the bugs*. This indicates that the candidates had insufficient knowledge about the number system. In part (b), most of the candidates managed to give the first two steps on simplifying Boolean expression but failed to complete other steps. Some of them simplified correctly the Boolean expression but failed to draw its logic gate circuit. Other candidates drew the truth table instead of simplifying the Boolean expression.

Furthermore, some candidates drew the logic gate circuit of the given Boolean expression without simplifying it. Others applied mathematical symbols to draw the logic circuit. This signifies that the candidates did not understand the requirements of the question. In part (c), most of the candidates failed to make logical relationship between AND gate and NOR gate. Some of the candidates drew separate AND gate and NOR

gate instead of using NOR gate to draw AND gate. Others drew truth table of AND gate and NOR gate. This indicates that, the candidates did not understand question's demands. Extract 2.1 presents a sample of such incorrect responses to question 2.

| | |
|---|--|
| 2 | <p>@ It is more efficient for a computer to use hexadecimal number system instead of binary number system for data representation due to the following reasons.</p> <p>(i) Hexadecimal number used in computation of number. Example 1111_2 in binary number is equal to $F_{(16)}$ in Hexadecimal number.</p> <p>(ii) Used in website for webpage colour. Ex In design HTML code there are colour used such as Red, Green and Blue. Hexadecimal number is used for combination of colour. Example Red represents $FF0000$, Green represents $00FF00$ and blue represents $0000FF$.</p> <p>(b) $F = XY + XYZ + XY\bar{Z} + \bar{X}YZ$</p> |
| 2 | <p>(b) $F = XY + XYZ + XY\bar{Z} + \bar{X}YZ$ — Given</p> <p>$F = Y(X + XZ + X\bar{Z} + \bar{X}Z)$ — Distributive law</p> <p>$F = Y(X(1 + Z + \bar{Z}) + \bar{X}Z)$ — Distributive law</p> <p>$F = Y(X(1 + Z) + \bar{X}Z)$</p> <p>$F = Y(X(1) + \bar{X}Z)$</p> <p>$F = Y(X + \bar{X}Z)$</p> <p>$F = YX + Y\bar{X}Z$</p> <p>1st Logic gate.</p> |



Extract 2.1: A sample of an incorrect response to question 2 of paper 1

In Extract 2.1, the candidate gave wrong reason for using hexadecimal over the binary number system in part (a). Also, the candidates failed to simplify the Boolean expression correctly hence drew a wrong logic gate. Moreover, the candidate could not use NOR gates to draw AND gate.

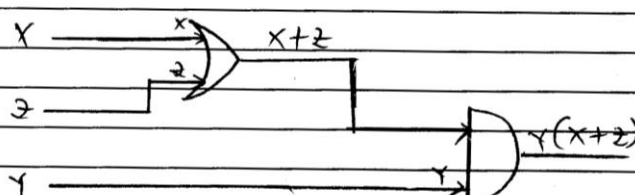
On the other hand, most of the candidates (9.73%) who scored average marks (3.5 - 5.5) managed to give one correct reason to explain why it is more efficient for the computer to use the hexadecimal instead of binary number system for data representation in part (a). Some of the candidates defined the terms *hexadecimal* and *binary number system* instead of giving the reasons. Other candidates repeated the same reason as if they were two different reasons. This made them lose some marks. In part (b), most of the candidates managed to simplify the given Boolean expression and drew correctly the required logic gate circuit. Some candidates followed all the procedures to simplify the given expression with improper arrangement of the expression in the last step. This made them draw a wrong logic gate circuit. In part (c), some candidates managed to draw AND gate using NOR gate. Other candidates applied OR gate instead of NOR gate to create AND gate. Moreover, some candidates combined two NOR gates to form OR gate instead of AND gate. This shows that the candidates had inadequate knowledge of drawing logic gates circuit.

The statistics show that a few candidates (8.73%) per cent scored high marks (6 - 10). The analysis of the responses shows that the candidates gave correctly at least one reason for the computer to use hexadecimal instead of the binary number system for data representation. Some candidates managed to give one correct reason and failed to give another reason by writing the difference between the hexadecimal and binary number system. This made them fail to score all the allotted marks. In part (b), the candidates simplified correctly the given Boolean expression and drew the required logic gate circuit. Some of the candidates managed to simplify the Boolean expression but failed to draw the logic gate circuit. In part (c), the candidates drew the correct AND gate by using NOR gates. Extract 2.2 presents a sample of a correct response to this question.

2a) i) This is because ~~hexa~~ a single hexadecimal digit has four bits, which thus enhances data compression leading saving of space in storage media.

ii) Also hexadecimal number system increases efficiency and effectiveness of a machine, because chances of errors and complexity of designing digital machines are simplified.

2b) $XY + XYZ + XY\bar{Z} + \bar{X}YZ$ --- given.
 $XY(1+Z) + XY\bar{Z} + \bar{X}YZ$ --- Distributive law.
 $XY(1) + XY\bar{Z} + \bar{X}YZ$ --- $X+1=1$
 $XY + XY\bar{Z} + \bar{X}YZ$ --- $X \cdot 1 = X$
 $XY(1+\bar{Z}) + \bar{X}YZ$ --- Distributive law.
 $XY(1) + \bar{X}YZ$ --- $X+1=1$
 $XY + \bar{X}YZ$ --- $X \cdot 1 = X$
 $Y(X + \bar{X}Z)$ --- Distributive law.
 $Y(X + Z)$ --- $A + \bar{A}B = A + B$
 $Y(X + Z)$ --- Hence simplified.



2c)

To obtain AND gate.

From let A and B be the input.

$$= \overline{A+B} \text{ --- given}$$

$$= \overline{(A+B)} \text{ --- NOR gate}$$

$$= (\overline{A} \cdot \overline{B}) \text{ --- DeMorgan's law}$$

$$= (A \cdot B) \text{ --- Double negation}$$

Logic gate (illustration).

$$Y = ((A+A)' + (B+B)')'$$

$$Y = ((\overline{A \cdot A}) + (\overline{B \cdot B}))'$$

$$Y = (\overline{A} + \overline{B})'$$

$$Y = \overline{\overline{A} \cdot \overline{B}}$$

$$Y = A \cdot B$$

$\therefore Y = A \cdot B$

From above illustration

Extract 2.2: A sample of a correct response to question 2 of paper 1

In Extract 2.2, the candidate managed to explain two reasons for hexadecimal to be more efficient than the binary number system in part (a). Also, the candidate simplified correctly the Boolean expression and managed to draw its logic gate in part (b). Furthermore, the candidate managed to use NOR gates to draw AND gate.

2.1.3 Question 3: C++ Programming

In this question, the candidates were required to read the scenario and then to answer the questions that follows;

You have been requested by a Natma Mall Director to construct a system that will offer a discount of 10%, if the quantity purchased costs more than Tshs. 100,000/-. The system prompts a seller to enter the quantity and price per item through a keyboard;

- (a) Write a pseudocode to calculate the total payable amount for any customers purchasing items from Natma Mall.
- (b) Write a corresponding C++ program from the pseudocode obtained in part (a).

A total of 298 (100%) candidates attempted this question, out of whom 260 (87.25%) scored 0 to 3 marks, 22 (7.38%) scored 3.5 to 5.5 marks and 16 (5.37%) scored 6 to 10 marks out of the 10 marks allocated. Figure 3 illustrates the candidates' performance on this question.

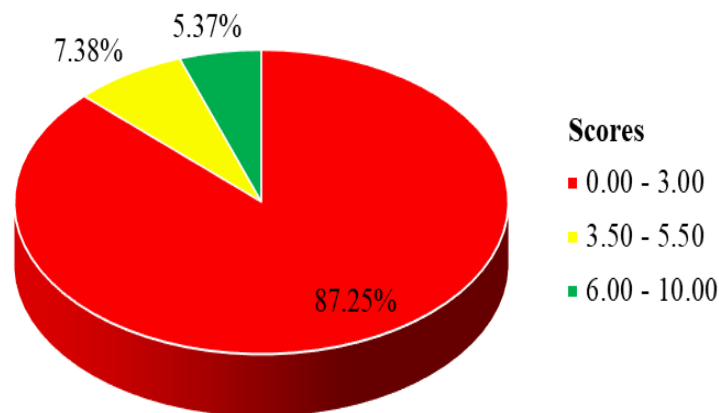


Figure 3: The Candidates' Performance on Question 3 of Paper 1

The general performance in this question was weak because 87.25 per cent of the candidates scored low marks (0 – 3). The candidates who scored low marks failed to write the correct variables as they are given from the scenario in part (a). Some of the candidates wrote the constant numeral values instead of declaring the corresponding variables. For example, the candidates wrote Tsh. 100,000/= instead of declaring it as a *quantity*. Other candidates failed to arrange the proper steps of designing pseudocode. Some of them wrote the steps of processing data before inputting of the data. The candidates failed to understand that any data in a pseudocode should be entered before being processed. Furthermore, some of the candidates wrote C++ program instead of writing the pseudocode. Others drew a flowchart instead of writing the pseudocode. This indicates that the candidates did not understand the questions.

In part (b), most of the candidates failed to write the correct C++ program from the written pseudocode. Some of the candidates wrote C++ program with the formula to calculate values without including the main function and variable declaration. Other candidates managed to declare the variables but failed to use the proper steps in implementing the program. Moreover, some candidates declared variables that did not exist in the scenario. Others applied incorrect loops such as “For loop” or “While loop” in a C++ program. This shows that the candidates had insufficient knowledge of C++ Programming. Extract 3.1 presents a sample of an incorrect response in question 3.

| | |
|-----|--|
| 3@ | Start. |
| i | Enter the quantity |
| ii | cin the quantity. |
| iv | Enter the price per item |
| v | cin the price per item |
| v | if the 10% is time to 100,000/-. |
| vi | stop cout the total payable amount. |
| vii | stop. |
| | |
| 3⑥ | #include <iostream> |
| | using namespace std; |
| | int main () |
| | { |
| | int quantity, p, Total; |
| | cout << "the program to display the total amount of Natma mall" << endl; |
| | cout << "Enter the quantity" << endl; |
| | cin >> quantity; |
| | cout << "Enter the price per item" << endl; |
| | cin >> p; |
| | Total = pq x 10% ; |
| | 100,000 |
| | cout << "The total is =" << Total << endl; "ghs" << endl; |
| | cout << endl; |
| | }; |

Extract 3.1: A sample of incorrect response to question 3 of paper 1

In Extract 3.1, the candidate managed to write and accept only the variables of quantity and price per item in the pseudocode in part (a).

However, the candidate failed to write the formula to find the discount and total payable amount. In part (b), the candidate declared correctly the variable of quantity, price per item and total cost. Nevertheless, the candidate failed to write the formula to find the total cost and total payable amount.

On the other hand, 7.38 per cent of the candidates who scored average marks (3.5 – 5.5) managed to identify and extract the variables from the given scenario. Also, they managed to write some of the pseudocode procedures in part (a). Some of the candidates applied wrong formula to find total cost and discount. Others wrote incorrect conditional statement for the total cost required to find the discount amount. In part (b), the candidates managed to declare and read variables. However, they applied a wrong formula with incorrect conditional statement.

The statistics show that a few candidates (5.37%) scored high marks (6 – 10). The candidates extracted correctly all the variables from the scenario and applied them to write the pseudocode in part (a). Also, the candidates were able to apply pseudocode in designing C++ program in part (b). Some of the candidates failed to write the correct formula in calculating total payable amount in pseudocode and C++ program. Others could not write all the required variables which made them lose some marks. Extract 3.2 presents a sample of such correct responses.

| | |
|------|--|
| 3 a) | Pseudocodes. |
| | |
| | Step 1 : Start . |
| | Step 2 : Input quantity , price . |
| | Step 3 : Cost = quantity * price |
| | Step 4 : IF cost is greater than Tsh 100,000 |
| | then |
| | new cost discount = $10/100 * \text{cost}$. |
| | new cost = cost - discount . |
| | display new cost . |
| | Step 5 : Else new cost = cost . |
| | display new cost . |
| | Step 6 : End . |
| | |

```

b) C++ program .

#include <iostream>
using namespace std;

int main() {
    int quantity, price, cost, newcost, discount;

    cout << "Enter number of items: " << endl;
    cin >> quantity;
    cout << "Enter price per item: " << endl;
    cin >> price;
    cost
    cost = quantity * price;

    if (cost > 100000) {
        discount = (10/100) * cost;
        newcost = cost - discount;
        cout << "The total amount is: " << newcost;
        cout << endl;
    } else {
        newcost = cost;
        cout << "The total amount is: " << newcost;
        cout << endl;
    }

    return 0;
}

```

Extract 3.1: A sample of a correct response to question 3 in paper 1

In Extract 3.1, the candidate managed to write the pseudocode but failed to list all useful variables in part (a). In part (b), the candidate was able to correctly declare variables and accept them into the program. Also, the candidate wrote the formula to find total cost, discount and total payable amount.

2.1.4 Question 4: Computer Security and Privacy

In this question, the candidates were required to read the scenario and then to answer the question that followed:

Student A sent a message “MAMBO” to student B through the email. Out of their understanding, student C was able to capture that message but in the form of “WKDQNBXR”. Student C failed to understand the meaning of that message because it was in different form so their communication remains protected.

- (a) Differentiate the message “MAMBO” from “WKDQNBXR”
- (b) What happened to the sent message which affected the word MAMBO to change its letters?
- (c) Explain two methods that can be used to ensure safe communication between student A and B.

A total of 298 (100%) candidates attempted this question, out of whom 250 (83.89%) scored 0 to 3 marks, 23 (7.72%) scored 3.5 to 5.5 marks and 25 (8.39%) scored 6 to 10 marks out of the 10 marks allocated. Figure 4 illustrates the candidates' performance on this question.

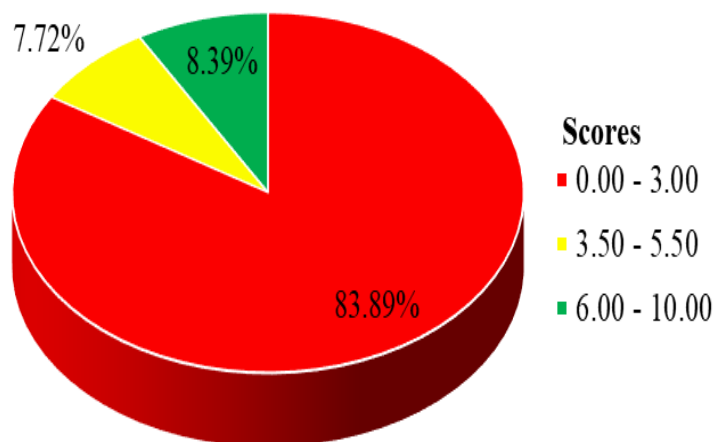


Figure 4: *The Candidates' Performance on Question 4 of Paper 1*

The analysis from the candidates' responses showed that most of the candidates (83.89%) who scored low marks in this question differentiated the message "MAMBO" from "WKDQNBXR" based on direct translation not based on the scenario in part (a). For example, one of the candidates wrote *A message MAMBO are in Swahili language and WKDQNBXR are in form of language which is not similar to Swahili language*. Some of the candidates related the two given messages with the programming languages. The candidates wrote MAMBO as a human or natural language while WKDQNBXR as the machine language. Other candidates differentiated the two messages by considering their character size. This signifies that the candidates lacked knowledge of the message encryption on a networking. In part (b), some of the candidates explained corruption by virus as the reason for the message to change its letters. Others wrote irrelevant reasons to explain why the message "MAMBO" changed to "WKDQNBXR". In part (c), some of the candidates managed to mention at least one method required to ensure safe communication between student A and B, but failed to explain them. Other candidates explained correctly one method but failed to explain another method. Furthermore, some candidates explained the function of network communication device such as router, switch and hub. This indicates that the candidates did not understand the question. Extract 4.1 presents a sample of such incorrect responses.

| | |
|-------|---|
| 4. a) | "MAMBO" is the net message in email while WKDQNBXR is the security of "MAMBO" message in the email of student B. |
| b) | They can not understand the language that can be write the student C so they don't know to receive the message in that personal. |
| c) | For putting a password it help to communicate well and when they need to open the message it can seen after open the personal password. |

| | |
|--|---|
| | ii) To get privacy and security: This it help |
| | to communicate well when your phone |
| | or computer have got a security and |
| | privacy in order to protect your phone, |
| | |

Extract 4.1: A sample of incorrect response to question 4 in paper 1

Extract 4.1 shows the response of the candidate who gave incorrect difference of the message “Mambo” from “WKDQNBXR” in part (a). In part (b), the candidate gave an incorrect reason which affected the word MAMBO to change its letters. In part (c), the candidate managed to explain correctly only one method that ensured safe communication between students A and B.

Further analysis from the candidates’ responses revealed that 7.72 per cent of the candidates who had average performance (3.5-5.5) differentiated correctly the message “MAMBO” from “WKDQNBXR” in part (a). Some of the candidates gave the meaning of message but failed to give the meaning of another message. In part (b), some of the candidates explained the reason which caused the word “MAMBO” to change its letters but failed to use the key terminology on their explanation. Others managed to state “encryption” as the reason for the message to change but failed to explain how it happened. In part (c), most of the candidates explained correctly at least on one method required to ensure communication. Some of the candidates had an idea but lacked the correct terminology of a particular method. For example, one of the candidates wrote *Using secret key*. The candidate should understand that the correct computer terminology for the secret key is a password. Furthermore, others explained the method of communication instead of method to ensure safe communication. For example, one of the candidates wrote *point to point communications* and *broad cast communications* which is the method of communication. This shows that the candidate had inadequate knowledge on computer security.

On the other hand, 8.39 per cent of the candidates who scored high marks differentiated correctly the message “MAMBO” from “WKDQNBXR” in

part (a). Some candidates were able differentiate them but failed to use the required terminologies. In part (b), the candidates explained clearly what caused the word MAMBO to change its letters. However, some of them gave partial explanations. The candidates defined the term *encryption* without relating it with the given scenario. This made them lose some marks. In part (c), the candidates explained correctly two methods required to ensure safe communication between students A and B. Some of the candidates repeated to explain the same method by using different terminologies. Extract 4.2 presents a sample of such correct response to question 4.

| | | |
|----|---|--|
| 4. | a) The message "MAMBO" is the original message sent by student A before encryption has taken place | |
| | with WHILE | |
| | The word "WIKIDMBRX" occurred after the original message was encrypted. | |
| | Hence the word is later decrypted by student C to obtain the original message "MAMBO" | |
| | | |
| | b) Encryption occurred, which made the sent message "MAMBO" to change its letter so as to avoid third parties like student C to get the information. | |
| | | |
| | c) i) Encrypt End to End Encryption | |
| | => The messages sent and received between student A and B should be encrypted so as third parties like student C cannot acquire the information. Encryption changes the original message to random characters while being transferred in a media, and the receiving end the message is decrypted so as to obtain the original message | |

| | | |
|--|--|--|
| | ii) Setting Passwords | |
| | => If the communication between Student A | |
| | and B involves files and folders, then the | |
| | files and folders should be attached by | |
| | high level passwords so that when the | |
| | unauthorized person like Student C get the | |
| | files / folders, will fail to open them to | |
| | see whats inside them. | |

Extract 4.2: A sample of correct response to question 4 in paper 1

In Extract 4.2, the candidate managed to differentiate the message “MAMBO” from “WKDQNBXR” in part (a). In part (b), the candidate explained the reason for the message “MAMBO” to change to “WKDQNBXR”, but did not provide clear explanation which led to lose some marks. In part (c), the candidate gave correctly two methods that can be used to ensure safe communication between students A and B.

2.1.5 Question 5: Web development

In this question, the candidates were required to read the scenario and then to answer the question that followed:

Form six students have decided to design a school website. In one of the pages, they included information related to time management in a class as it appears in Figure 1.

Class Time Management

All students in our class are working very hard in order to get good performance in all of our subjects. One of the strategies we have is how we should spend our time effectively everyday.

These are some questions which remind our responsibilities:

- Who am I?
- Where I am?
- What am I doing?
- Is it the right time?

To verify the **current day and time** that let a student remember where he/she should be, click the button below:

Play Your Part As a Hardworking Student, Surely You Will Perform MARVELOUS!

View Day & Time

Figure 1

Write HTML codes that used to display a designed page.

Use the following Page Descriptions:

- (i) Page background colour should be Magenta.
- (ii) Heading should have level 1 effect.
- (iii) Text colour of the last sentence should be red.
- (iv) When a user clicks 'View Day & Time' button, a statement 'Play Your Part As ' should be replaced with a current day and time.

A total of 298 (100%) candidates attempted this question, out of whom 99 (33.22%) scored 0 to 3 marks, 122 (40.94%) scored 3.5 to 5.5 marks and 77 (25.84%) scored 6 to 10 marks out of the 10 marks allocated. Figure 5 illustrates the candidates' performance on this question.

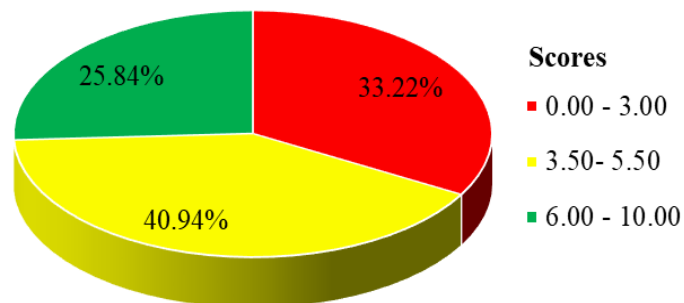


Figure 5: *The Candidates' Performance on Question 5 of Paper 1*

The general performance on this question was average because majority of the candidates (66.78 %) scored 3 marks. The analysis shows that some of the candidates who scored high marks (6.5 – 10) were able to open and close HTML tags correctly. Also, they applied correctly the formatting tags and set magenta background colour as it is instructed. The candidates managed to set heading with the size of level 1 and formatted the last sentence with red colour as required. The candidates managed to create button and label with the text "View Day & Time". However, some of the candidates failed to activate the button to display the current day and time using JavaScript. Other candidates applied "colour" instead of an attribute "color" to set the font colour of the text and background colour of the page which made them lose some marks. This signifies that the candidates had insufficient knowledge of website development. Extract 5.1 represent a sample of such correct response to question 5.

| | | |
|----|---|--|
| 5. | <!DOCTYPE html> | |
| | <html> | |
| | <head> | |
| | <title></title> | |
| | </head> | |
| | <body bgcolor="Magenta"> | |
| | <h1>Class Time Management </h1> | |
| | <hr> | |
| | <p>All students in our class are working very hard in order to get good performance in all of our subjects. One of the strategies we have is how we should spend our time effectively everyday. | |
| | </p> | |
| | | |
| | <p>These are some questions which remind our responsibilities: | |
| | </p> | |
| | | |
| | <ul type="circle"> | |
| | Who am I? | |
| | Where I am? | |
| | What am I doing? | |
| | Is it the right time? | |
| | | |
| | | |
| | <p>To verify the current day and time that let a student remember where he/she should be, click the button below: | |
| | </p> | |
| | | |
| | <p id="this"> | |
| | Play Your Part As a Hardworking Student, ^{Surely} You Will Perform MARVELOUS! | |
| | </p> | |
| | <button onclick="document.getElementById('this').innerHTML = Date();" > View Day & Time </button> | |
| | </body> | |
| | </html> | |

Extract 5.1: A sample of a correct response to question 5 in paper 1

In Extract 5.1, the candidate managed to write open and close HTML tags, inserting, background colour, heading level 1 and horizontal line. Also, the candidate applied correctly the formatting tags, insert text and colour. Moreover, the candidate managed to create a button which activated it correctly using JavaScript. However, the candidate failed to write tags to display unordered list of questions.

On the other hand, the candidates (40.94%) who had average performance wrote the correct syntax of html codes. They also managed to insert a text and the background colour. Most of the candidates managed to apply heading level 1 to the statement “Class Time Management”. However, a few of them wrote “<h>” without indicating level1 as “<h1>”. Others wrote the correct tags “<h1> Class Time Management </h1>” but, they located at the head section instead of locating it at the body section of the page. Moreover, some candidates applied CSS tags instead of HTML tags to set text colour and background colour of the page. This shows that the candidates did not understand the question. Further analysis showed that most of the candidates who scored average marks were able to create the “*View Day & Time*” button but failed to activate the button using JavaScript codes.

On the other hand, 33.22 per cent of the candidates who scored low marks (0 – 3) managed to write the opening and closing html tags. Some of the candidates set correct head level size 1. Others were able to apply the correct formatting tags required to break statements and bold text. However, most of the candidates failed to set colour for the body and text. Some candidates set the body colour out of the body tags. This indicates that the candidates had inadequate knowledge of the HTML codes. Other candidates wrote table tags to list questions instead of using unordered list tags. Furthermore, some candidates had misconception on writing heading levels. For example, one candidate wrote “*1 level effect*” within the head tag as <head> *1 level effect* </head>. This indicates that the candidates had insufficient knowledge on the writing heading levels. Moreover, most of the candidates in this group failed to create and activate the button using JavaScript. Extract 5.2 presents a sample of incorrect responses.

| | |
|----|--|
| 5. | |
| | IDOWTYPE! |
| | <HTML> |
| | <Head> |
| | Class Time Management |
| | </Head> </br>. |
| | <body> |
| | All Students in our class are working very hard |
| | in order to get good performance on all of our |
| | subjects. one of the strategies we have is how |
| | we should spend our time effectively everyday. |
| | </br>. |
| | There are some questions which remind our |
| | responsibilities: </br>. |
| | <Align>= CTRL+R </align>. |
| | Full stop who am I? </br> |
| | Full stop where I am? </br>. |
| | Full stop what am I doing? </br>. |
| | Full stop Is it the right time? </br>. |
| | </br>. |
| | Text colour = "RED" play your part as a |
| | hardworking student, surely you will perform |
| | MARVELOUS |
| | width = "10": length = "15"<table></table>. |
| | View day & Time. |
| | page background colour = "Magenta" |
| | </body> |
| | </HTML>. |

Extract 5.2: A sample of incorrect answer in question 5 of paper 1

In Extract 5.2, the candidate managed to open and close HTML and use the formatting tags that break. However, the candidate failed to insert the page background colour and heading level 1. Also, the candidate failed to write html codes required to insert the text colour, to list questions using unordered format and to insert a button.

2.1.6 Question 6: Visual Basic Programming

In this question, the candidates were required to;

- (a) identify the controls that can perform the following tasks on a form;
 - (i) Enable an event to occur repeatedly at a specific interval.
 - (ii) Draw circles, ellipses, squares and rectangles within the form.
 - (iii) Display text that is not editable on the form.
 - (iv) Display information from an existing database.
- (b) describe the relationship between forms and controls as used in Visual Basic (VB) programming.
- (c) explain the procedures for adding new forms to the visual basic (VB) project.

A total of 298 (100%) candidates attempted this question, out of whom 246 (82.55%) scored 0 to 3 marks, 20 (6.71%) scored 3.5 to 5.5 marks and 32 (10.74%) scored 6 to 10 marks out of the 10 marks allocated. Figure 6 illustrates the candidates' performance on this question.

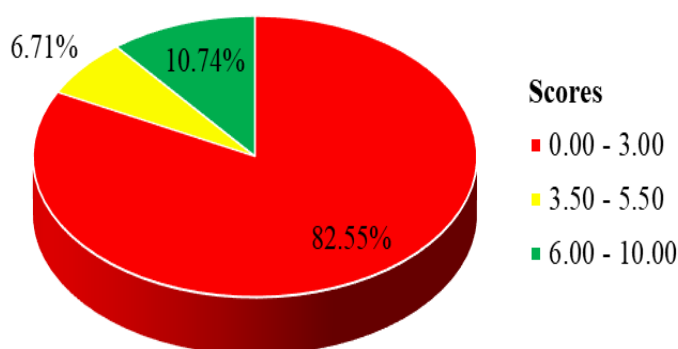


Figure 6: The Candidates' Performance on Question 6 of Paper 1

The general performance on this question was weak because 82.55 per cent of the candidates scored low marks (0 – 3). Most of the candidates who scored low marks were able to identify at least one control required to perform one of the analysed task in a Visual basic form in part (a). Some candidates wrote program control structures such as *looping structure*, *sequential structure* and *conditional structure* instead of forming controls which include timer, text box, label, etc. Others wrote different types of bars found on Visual Basic IDE such as menu bar and tool bar. This signifies that the candidates had insufficient knowledge of the controls

used in Visual Basic (VB). In part (b), majority of the candidates managed to define and explain the terms, “forms” and “control” but failed to relate them. Other candidates managed to write relationship between the given objects but failed to explain in detail. For example, one of the candidates wrote *The relationship between form and controls allow the user to insert information on to the form*. This implies that the candidates had inadequate knowledge of Visual Basic objects. In part (c), some of the candidates wrote stages of system development like; recognition, definition, design, cognition, testing, debugging and documentation. Other candidates did not attempt this part of the question. Extract 6.1 presents a sample of such incorrect responses.

| | |
|----|--|
| 6. | (a) |
| | (i) Radio box. |
| | (ii) Combobox. |
| | (iii) Textbox |
| | (iv) macros. |
| | |
| | |
| | (b) Form It be used to creating a format on what you want to display at a moment while controls its used to create or to control the enterface of a project. |
| | |
| | |
| | (c) First we a supposed to oppen. Visual Basic then a user are supposed to click a form. |
| | |

Extract 6.1: A sample of incorrect answer in question 6 of paper 1

In Extract 6.1, the candidate wrote other control tools which do not solve the given tasks in part (a). In part (b), the candidate gave partial explanations while relating “forms” and “controls”. In part (c), the candidate wrote the procedures of creating “new form” rather than the required procedures of “adding new form” to the already existing project.

On the other hand, the candidates 6.71 per cent who scored average marks (3.5-5.5) identified correctly two to three controls with other incorrect controls in part (a). In part (b), the candidates explained partially the relationship between forms and controls. Some of the candidates wrote the function of “forms” and “controls” instead of showing how forms and controls are related to each other in the Visual Basic Programming. This shows that the candidates failed to understand the question. In part (c), the candidates wrote steps of creating new forms instead of steps for adding new forms to the Visual Basic (VB).

The statistics show that a few candidates (10.74%) scored high marks (6 – 10). The analysis of the responses shows that majority of the candidates identified correctly three to four control objects with other incorrect form controls in part (a). In part (b), the candidates managed to relate the Visual Basic (VB) objects form and control. However, some of the candidates gave unclear relation of the objects. Hence, they could not score full marks on this part. In part (c), the candidates gave correct steps for adding new form in the Visual Basic (VB) project. However, some of the candidates provided steps for opening the Visual Basic (VB) form instead of the steps for adding new forms in the Visual Basic project. This led to loss of some marks. Extract 6.2 presents a sample of such correct responses to question 6.

| | | | |
|----|-----|---------------------------------------|--|
| 6. | a) | (i) By Using Timer-control can do so, | |
| | | (ii) Shapes, control, | |
| | | (iii) Label control, | |
| | | (iv) By Using Data Control e.g. using | |
| | | Data control, ADOO control e.t.c. | |
| | (b) | The forms is the place where the | |
| | | Controls are placed in VB, a/so | |
| | | Controls can not work without the | |
| | | form after Loading, By using Control | |
| | | the form can perform certain event | |
| | | triggered after click the Control. | |

| | | |
|--|--|--|
| | c) → After Open the Visual Basic Integrated Environment. | |
| | → On the Menu Bars windows. | |
| | → Click the Project tab, | |
| | → the Drop-down menu open. | |
| | → Click the Add form | |
| | → Then The form will be Added to the Project windows. | |
| | But on the Selection of the form | |
| | ones can Add Normal form or | |
| | MDI form according to the User | |
| | Choice. | |
| | OR. | |
| | → On the Current form Right click the form. | |
| | → Then Add New form | |
| | → The form will Open. | |

Extract 6.2: A sample of correct answer to question 6 of paper 1

In Extract 6.2, the candidate wrote controls as instructed in part (a). In part (b), the candidate gave precise and good explanations on how forms and controls are related. Furthermore, in part (c); the candidate wrote incorrect procedures of adding new forms.

2.1.7 Question 7: IT and Environment

In this question, the candidates were required to study the scenario and answer the questions that followed. The question read as follows:

A software developer working on Delle- IT Company spends almost 14 hours a day on the computer to fulfil official duties. After a consecutive two years of the working schedule, he started falling sick;

- Identify three health risk hazards associated with the extended use of a computer.
- Explain the possible three solutions for each health risk identified in 7(a).
- Briefly explain the main challenge that any IT company may face when disposing computer parts.

A total of 298 (100%) candidates attempted this question, out of whom 126 (42.28%) scored 0 to 3 marks, 109 (36.58%) scored 3.5 to 5.5 marks and 63 (21.14%) scored 6 to 10 out of the 10 marks allocated. Figure 7 illustrates the candidates' performance on this question.

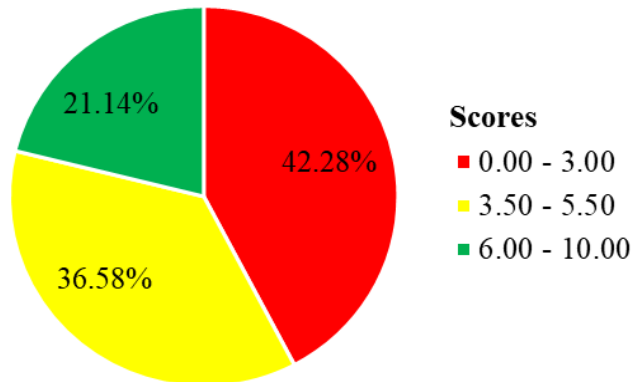


Figure 7: *The Candidates' Performance on Question 7 of Paper 1*

The general performance of the candidates on this question was average because, 57.72 per cent of the candidates scored above 3 marks. Most of the candidates (21.14%) who scored high marks (6-10) were able to give three health hazard associated with the extended use of computers in part (a). In part (b), some of the candidates managed to write three solutions for each health hazards. However, other candidates managed to give only one solution for each health hazard. This signifies that the candidates had insufficient knowledge about IT and environment. In part (c), most of the candidates explained correctly main challenges that any IT company may face when disposing computer parts. Some of the candidates gave correct challenges but failed to explain them. Other candidates managed to explain the main challenge but not in detail. This made them lose some marks. Extract 7.1 presents a sample of such correct responses

| | |
|----|--|
| 7. | a) i) Repetitive Strain Injury |
| | => This is a computer health hazard caused |
| | when a user doesn't use well the keyboard |
| | or using the keyboard for a very long |
| | time. This causes the hands wrist to |
| | have strain injury |

7. \rightarrow a) ii) Eye Strain

\Rightarrow This is a computer health hazard caused when a user stares to a computer monitor / screen for a very long time. This causes eye strain. Also using bright light in a dark room.

iii) Backbone / Spinal Chord Injury

\Rightarrow This is a computer health hazard caused when a user doesn't sit properly on a chair while using a computer / sits for a very long time in the same posture. This leads to backbone / Spinal cord injury.

b) Solutions to health hazards above

i) Repetitive strain injury

\Rightarrow The computer user should learn how to type using a keyboard well, and also he/she should consider short breaks after typing for a long period. Also the user should consider using ergonomic keyboards.

ii) Eye Strain

\Rightarrow The computer user should avoid using bright light in dark rooms. The user should also take short breaks after some period of using the computer. The user should also avoid staying very close to the computer screen / monitor / screen.

| | |
|----|---|
| 7. | b) iii) Back bone / Spinal cord injury |
| | => The computer user should sit properly on the chair while using a computer. The user should also take short breaks for stretching after sitting for a long period. The user should also consider using an ergonomic chair. |
| | c) Environmental pollution |
| | => Through disposing computer parts like monitors, keyboards, mouse, system units and other computer parts. The IT company will be faced by environmental pollution challenge, as the computer parts are very dangerous to the environment. |

Extract 7.1: A sample of correct answer in question 7 of paper 1

In Extract 7.1, the candidate managed to identify correctly three health risk hazards in part (a). Also, the candidate explained three possible solutions for each health risk in part (b). Furthermore, the candidate managed to explain precisely the challenge that any IT company faced when disposing computer parts in part (c).

Statistics showed that 36.58 per cent of the candidates scored average marks (3.5-5.5). Most of the candidates managed to identify correctly at least two health hazards in part (a). In part (b), some of the candidates managed to explain only one possible solution to each health risk. This implies that the candidate had insufficient knowledge of health hazards associated with the extended use of the computer. Some of the candidates managed to identify the health risk but failed to give its solution. In part (c), some of the candidates managed to state correctly the main challenge that any IT company may face when disposing computer parts but failed to give detailed explanation of the challenge. Others associated the disposal process with shortage of computer parts. For example, one of the candidates wrote *losing of repairs of computers. When disposing computer*

parts, the company may face with the problem of inadequate parts during computer repairing because these parts are already disposed. This indicates that the candidates had insufficient knowledge on how to dispose computer parts.

On the other hand, 42.28 per cent of the candidates who scored low marks managed to identify one health hazards in part (a). Some of the candidates wrote other health problems which are not related to the extended use of computer. For example, one candidate wrote *reproductive problems, Lung cancer and blood cancer* instead of back and neck strain, repetitive strain injury, eye strain, headaches or pain in the joints. In part (b), majority of the candidates managed to explain only one possible solution for each identified risk hazard. However, some of the candidates failed to associate the risk hazard with its respective solution. In part (c), some of the candidates wrote challenges that the IT company face when losing computer parts instead of the main challenge faced when disposing computer parts. For example, one candidate wrote; *losing of data and information*. Other candidates wrote other normal challenges that the company faces when disposing computer parts including weak availability of resources and lack of power supply. This signifies that the candidate did not understand the question. Extract 7.2 presents a sample of such incorrect responses.

| | | |
|------|---|--|
| 7 | → Eyes because of lightning of the monitor to the | |
| 7(a) | Computer. | |
| | → Radiations which is caused by light which | |
| | occurs to the monitor of display of the | |
| | Computer. | |
| | → Electric short which is caused by poor connection | |
| | of cables and Computers. | |
| | | |

| | | |
|-----|---|--|
| (b) | • Avoid using high amount of light which can cause eye damage | |
| | | |
| | • Avoid poor connections of cables which can takes place to the computer if before power ON should check the connection in order to avoid electric short. | |
| | • Avoid unnecessary movement which can cause the computer to become damaged either by brocking it down. | |
| | | |
| (c) | → Poor connections of computers which can cause electric short. | |
| | → Unavailability of electricity which is used to power ON the computer. | |
| | → Poor connections of wires which can be used to power ON the computers. | |
| | | |

Extract 7.2: A sample of incorrect answer to question 7 of paper 1

In Extract 7.2, the candidate identified correctly one of the health hazards required in part (a). In part (b), the candidates wrote only one possible solution for one health risk without explanation. Furthermore, in part (c); the candidate failed to explain the main challenge that any IT company faced when disposing computer parts instead he/she explained about loss of electricity and electric short circuit.

2.1.8 Question 8: Information System

This question was an essay question and the candidate was required to read the scenario then, to answer the question that followed. The question read as follows:

The Dar es Salaam Institute of Technology has recently experienced exponential increase of the students and staff members. The institute has planned to establish a database to store their data and be handled easily. Describe six advantages the institute would enjoy from the new plan.

The statistics shows that 289 (97.0%) candidates attempted this question, of whom 87 (30.10%) scored 0 to 5 marks, 129 (44.64%) scored 5.5 to 8.5 marks and 73 (25.26%) scored 9 to 15 out of the 15 marks allocated. Figure 8 summarises the candidates' performance on this question.

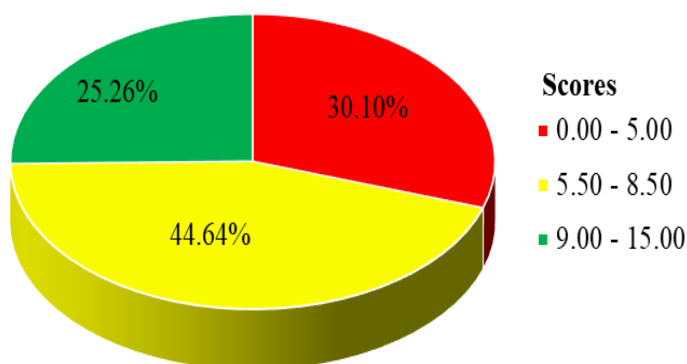


Figure 8: *The Candidates' Performance on Question 8 of Paper 1*

Generally, the candidates' performance on this question was good because 69.9 per cent of candidates scored 5.5 to 15 marks. The analysis of the candidate's responses showed that the candidates (25.26%) who scored high marks (9 to 15) gave correct introduction of database and suggested the correct advantages of database in an institution. However, some of the candidates did not give detailed explanations which led to loss of some of the marks. It was also observed that some candidates wrote correct advantages of database in an institution but failed to give clear introduction and conclusion. Other candidates repeated some advantages by using different terms/words with the same meaning. Moreover, some candidates wrote correct introduction and all six advantages of database without giving a conclusion. This made them fail to score full marks. Extract 8.1 presents a sample of such correct responses.

| | |
|---|--|
| 8 | <p>A database is a collection of records and files that contain useful information. A database is divided into two parts flat-table database and relational database. Relational database is inform of tables and col rows and columns with the ability of showing a relationship between tables. This is done by the help of primary key and foreign key. With a database the institute would be able to enjoy the following advantage.</p> <p>Ease of access; a database can easily be access by anyone with the permitted access. This means that the staff who want to create forms, reports and queries can all access the database from their computers. Hence there is no need for moving from one place to another to require a copy of a student's information. As it can easily be retrieved from the database.</p> <p>Reduced security risk; a database can be made in such a way that it restricts unauthorized access. This means that anyone without the password will not be able to get any information from the database. Therefore there will be no leaking of personal information for the students and staff. Such as their home address, phone numbers.</p> <p>Reduces redundancy; with a database one can set a field so as it only accepts unique data. This removes the problem of repetition of data in the database. Since this can be done automatically then it also removes the tedious work of removing anomalies from the database.</p> <p>It is cost effective; this is because the cost of using a manual database for a large institution is grand. As many papers/books have to be used to record the new arrivals of students/staff. Hence with a database the</p> |
|---|--|

| | |
|---|--|
| 8 | institution is will only need one computer that will act as a server. Which is a small price comparing to its advantage. |
| | A database offers unlimited space for insertion of new data; this means that the institute will no longer need to find another way to store their data for a few years. Also as the records and fields have already been saved, the database can be used over and over without having to create a new database. For example microsoft access offer a large number of fields that can be inserted according to the users needs. |
| | It is easy to link a database to a website; that can be accessed by students and staff. Comparing to a spreadsheet or a microsoft document, a database can easily be linked to the website of the institute. Where the public can see it's number of students, also since only the database administrator can access the and change the information. Then no risk of data breach. |
| | In conclusion the institute would benefit and solve most of their problems with a database. Other requirements such as a database administrator who will manage the database. Also the software that will be used to create the database. Are all important things that the institute will need to make their new plan work. |

Extract 8.1: A sample of correct responses to question 8 of paper 1

In Extract 8.1, the candidate gave the correct introduction and conclusion. Also, the candidate gave correct advantages of database the institute would enjoy for the new plan.

The candidates (44.64%) who scored average marks (5.5 to 8.5) managed to write advantages, introduction and conclusion of database but failed to explain them in detail. Some of the candidates wrote correctly three to four advantages with other incorrect advantages of database. Other candidates only defined database as an introduction and provided incorrect

conclusion. Furthermore, some candidates wrote disadvantages instead of advantages of database. For example, one of the candidates wrote *database is time consuming because members of an institution will spend more time accessing data stored in a database*. This indicates that the candidates had insufficient knowledge of the database concepts.

On the other hand, most of the candidates (30.10%) who scored low marks (0 – 5) did not understand the question. Some of the candidates explained the characteristics and advantages of computer instead of advantages of database. A few candidates interpreted database as a program or software. This implies that the candidates lacked knowledge of database. Moreover, some of the candidates outlined the advantages of database without giving explanations. Other candidates did not write an introduction and a conclusion. Extract 8.2 presenting a sample of incorrect responses.

| | |
|----|--|
| 8. | Dar es salaam Institute of Technology is the Institute which deals with technological issues, example of technological issues such as IT and TET, |
| | The following are the advantage which of Dar es Salaam Institute of Technology obtain from their new plan. |
| | Enable to increase availability of computer programmers; Dar es Salaam Institute of Technology also they need to obtain more computer programmers from their Institute. |
| | Enable to obtain technology fit; but also Dar es salaam Institute of Technology are enable to handle and control our technology, example of technology such as NIDA numbers. |
| | It enable to get web designer; Dar es salaam Institute of Technology, also as the Institutes used to produce many designer of webs, in order to perform different task occur to the web. |

| | |
|--|---|
| | It enable to Increase IT tech technicians in our |
| | country", Dar es Salaam Institute of Technology also |
| | it help to get many technicians in our societies |
| | in order to control different occurred in technological |
| | Issues . |
| | It enable to maintain and control our technology, |
| | Dar es Salaam Institute of Technology also are used |
| | to maintain and control different problem occurred, |
| | but this problem deals with technological issues . |
| | Finally, IT technology it increase availabilities |
| | of unemployment to the societies, example as activities |
| | such as Manufacturing of Industry, and Account clerk . |
| | |

Extract 8.2 A sample of incorrect answer to question 8 of paper 1

In Extract 8.2, the candidate wrote about advantages of ICT in an institution instead of advantages of database. Also, the candidate wrote incorrect introduction and conclusion.

2.1.9 Question 9: Data Communication and Networking

This was an optional question. The candidates were required to study the scenario and answer the questions that followed. The question read as follows:

A new bank TBP established in Dodoma is planning to own branches in 10 more regions of Tanzania. The bank wants to have all its offices to be connected electronically. Describe six important devices which can assist the bank to implement the idea.

The statistics show that 196 (65.8%) candidates attempted this question, of whom 134 (68.37%) scored 0 to 5 marks, 31 (15.82%) scored 5.5 to 8.5 marks and 31 (15.82%) scored 9 to 15 out of the 15 marks allocated. Figure 9 summarises the candidates' performance on this question.

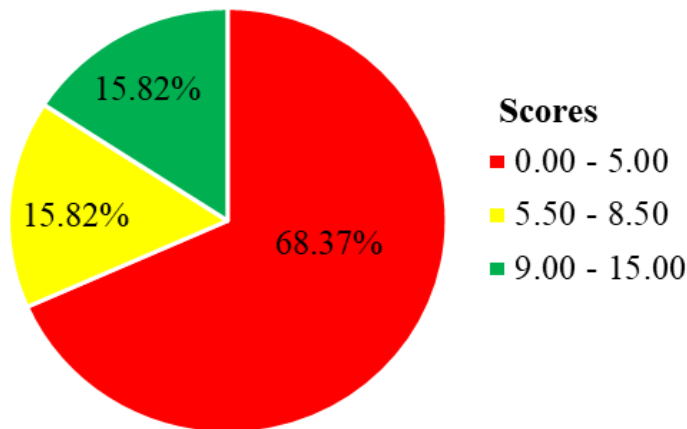


Figure 9: *The Candidates' Performance on Question 9 of Paper 1*

The general candidates' performance on this question was weak because 68.37 per cent scored low marks (0 – 5). The analysis shows that the candidates who scored low marks managed to write at least one networking device that TPB bank will need to establish branches in other regions. Most of the candidates failed to give correct introduction and conclusion. Some of the candidates gave partial description of networking devices and failed to explain how they can be used to link different branches of TPB bank. Others failed to describe networking devices. Instead they made the description of other terms such as computer, bank, etc. In addition to that some of these candidates wrote things needed when opening an office instead of networking devices. For example, one candidate wrote; *use of computer, use of camera, ATM machine, server, printer, monitor*. This implies that the candidates did not understand the question. Furthermore, some of the candidates wrote different types of network topologies and others wrote the importance of using computer. However, a few candidates managed to write at least one network device but failed to give the correct description. This led them to score less marks. Extract 9.1 presents a sample of such incorrect responses to this question.

| | |
|----|--|
| 9. | <p>A system it refers to the collection of software together with the hardware in which to allow a specific or the intended task to be performed. therefore a system should have the following hardware in which to insure a specific task to be performed. for example when it comes to Bank System the following devices are needed in order to allow communication this includes the following:</p> <p>Input devices this refers to the devices which are used to enter data inside a computer where by we have devices like keyboards, scanners in which they can be used in entering of data in a system.</p> <p>Output devices this are the devices in which they tend to give out the information or in short Output devices are used to display the information into this Output devices we have Printers, Monitors and many others where by when it comes to the devices like printer its major aim is to convert softcopy to hardcopy in data form therefore this is much useful when it comes to the institution like banks.</p> <p>Processing devices simply CPU this is the device in which is used to process raw data to finished information. Where by when it comes to the user institution like banks CPU can be performed used to perform arithmetic calculation and process them within a short period of time.</p> |
|----|--|

| | |
|----|---|
| 9. | <p>Communication devices this refers to the devices in which are used to exchange data from one point to another where by the communication devices are very useful to institution like bank which are in different place where by they can easily share transaction record in which tend to be performed daily in there branched. example Routers</p> <p>Storage devices this refers to the devices which are very important since the help in the storing of useful data in the system. The devices are very important to the institution like banks where by transaction tend to take place daily therefore they will require this device in order to keep there transaction record for future use.</p> <p>Ingenerally for the system like for Bank institution to work effectively the above device will help to bring about communication from one branch to another branch efficiently without any problem.</p> |
|----|---|

Extract 9.1: A sample of incorrect answer to question 9 of paper 1

In Extract 9.1, the candidate mentioned and explained the hardware devices of the computer system instead of network devices as required by the question.

The analysis shows that 15.82 per cent of the candidates who scored average marks (5.5 – 8.5) managed to explain at least two correct networking devices. Some candidates described different types of transmission media such as optical cable, twisted pair cable and wireless transmission instead of network devices such as router, hub, switch, etc. The candidates were required to understand that transmission media and network devices are two different component of the networking. Some candidates gave a correct introduction and conclusion but failed to describe some of the network devices.

On the other hand, 15.82 per cent of the candidates who scored high marks (9-15) gave correct introduction and explained correctly six networking

devices that would be useful in establishing branches of TPB bank in other regions with a correct conclusion. Some candidates wrote correct introduction, explained correctly four networking devices but failed to give a detailed explanation of the other two networking devices. Other candidates wrote correct networking devices with an incorrect introduction and conclusion. This made them lose some marks. Extract 9.2 presents a sample of such correct response.

| | |
|----|---|
| 9. | <p>A network is an interconnection of two or more computers purposely for sharing information and various devices or peripherals such as printers. In order to form a good and effective network, there are important devices which need to be considered in the connection. These devices are:</p> <p>Modem. Modem is short form for Modulator Demodulator. It is a device which is used to convert digital signals to analog signals for transmission over an analog medium, and also analog signals to digital signals for transmission over a digital medium. Modems are important since they help to enhance communication especially through telephone lines.</p> <p>Bridge. A bridge is a device which is used to separate a network into segments. Separating a network into individual segments helps to reduce network traffic and therefore it avoids unnecessary congestion of signals and data in the network.</p> <p>Hub. A hub is a device which helps to connect the computers in a network. In a network with a hub, all data transmission is through the hub. From the hub, data signals are then sent to the receiving node by broadcasting. Only the intended receiver is able to receive the broadcasted message.</p> <p>Router. A router is a device which connects computers in a network and directs the transfer of data packets in a network. The transfer of data packets is directed through the use of checking of network addresses. Each network has a unique address and hence the address is checked to determine whether the network is the intended one. If not, the data packets are transferred to another network.</p> <p>Gateway. A gateway is a device which has been configured to provide access to Wide Area Networks (WANs) such</p> |
|----|---|

| | |
|----|--|
| 9. | as the internet. Gateways are therefore very important in a network since they provide a means for the network users network users to access the internet together with other users in the world. |
| | Switch. A switch is a device which helps to connect computers in a network. A switch is very similar to a hub except that it transfers data signals from the transmitting node directly to the receiving node without broadcasting. Switch Switches are usually more expensive than hubs. |
| | Networks are therefore very important in the modern digital world. This is due to the various advantages that come with networks such as file sharing, resource sharing, communication together with entertainment. |

Extract 9.2: A sample of correct answer to question 9 of paper 1

In Extract 9.2, the candidate explained correctly six networking devices required to assist the bank to be connected electronically. Also, the candidate managed to write the introduction and the conclusion.

2.1.10 Question 10: Problem Solving

This question was optional and it carried a total of 15 marks. The question required the candidate to:

- Design an algorithm using flowcharts for a program to find and print all prime numbers between 1 and 50. The program should also count and display their number.
- Use C++ programming to create the program that would implement the algorithm in 10 (a).

The statistics show that 110 (36.9%) candidates attempted this question, of whom 103 (93.64%) scored 0 to 5 marks, 7 (6.63%) scored 5.5 to 8.5 marks out of the 15 marks allocated. On the other hand, there was no candidate who managed to score 8.5 to 15 marks. Figure 10 summarises the candidates' performance on this question.

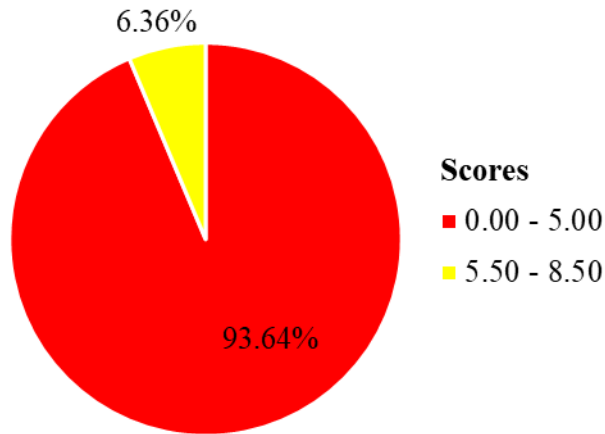
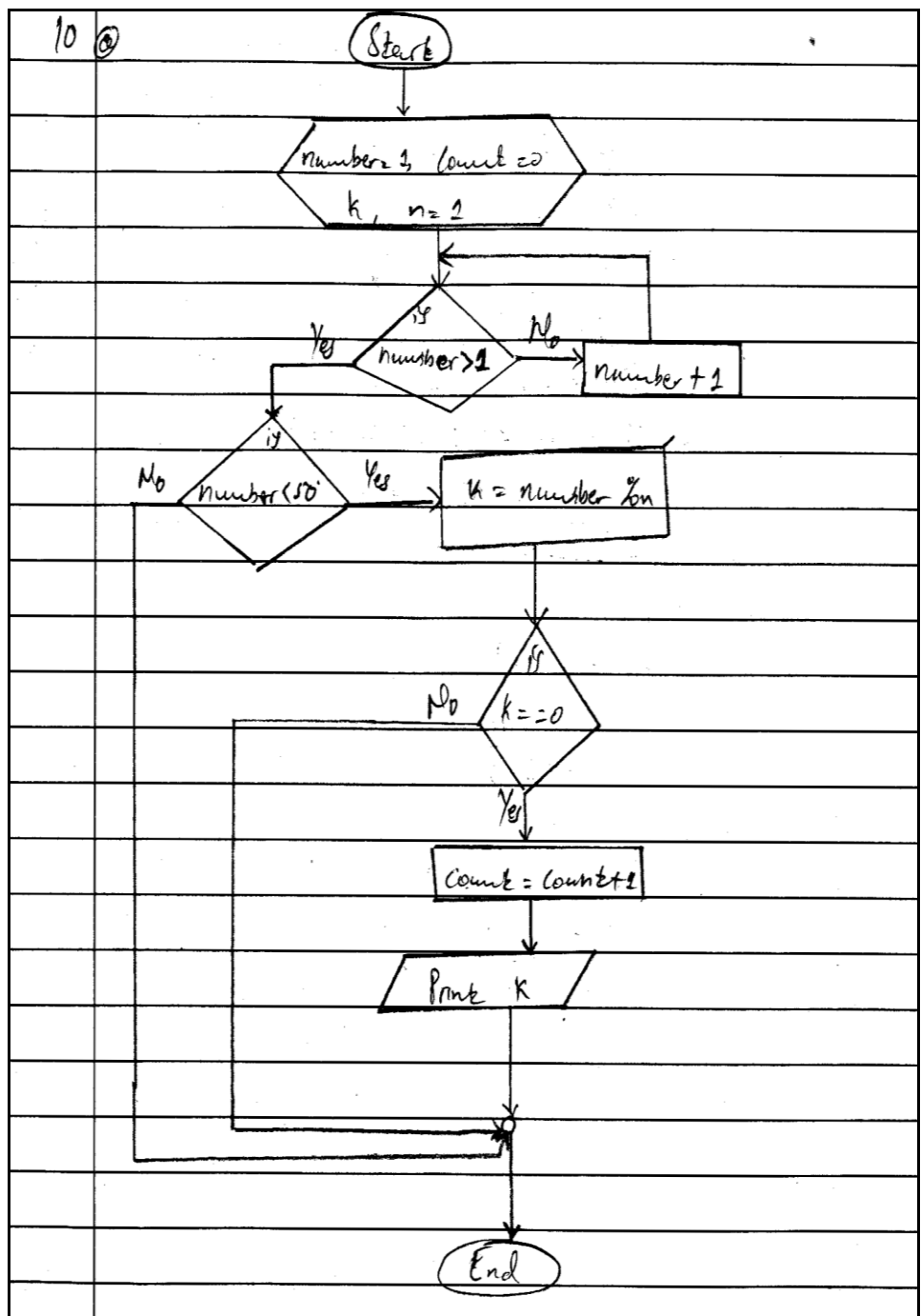


Figure 10: *The Candidates' Performance on Question 10 of Paper 1*

The general performance of candidates on this question was weak because 93.64 per cent of the candidates scored low marks (0 – 5). In part (a), most candidates who scored low marks drew correctly “start” and “stop” symbols of the flowcharts, decision symbols, process operations and input/output statements. On the other hand, they failed to initialize the counter variables. This shows that the candidates had insufficient knowledge in other symbols of the flowcharts. Some of the candidates drew a parallelogram for variable initialization statement instead of a rectangle. Other candidates were able to draw decision symbols but failed to write the correct condition that will provide correct decision in the flowchart. In part (b), some candidates wrote correct variable declaration and initialization but failed to use the iteration structures such as ‘do...while loop’, ‘while loop’ and ‘for loop’ to implement the algorithm. Further analysis shows that most of the candidates were not able to translate the algorithm created in part (a) into relevant C++ program. Extract 10.1 presents a sample of such incorrect response to this question.



| | |
|----|--|
| 10 | 10 |
| | #include <iostream> |
| | using namespace std; |
| | int main () |
| | { |
| | int number; |
| | int count = 0; |
| | int k; |
| | count << "The prime numbers between 1 and 50 are; " << endl; |
| | for (number > 1; number < 50; number++) { |
| | for (int n = 1; n < number + 1; number++) { |
| | . |
| | k = number % n; |
| | |
| | if (number % n == 0) |
| | { count << k << endl; |
| | count = count + 1; } |
| | } |
| | } |
| | count << "There are " << count << " prime numbers." << endl; |
| | |
| | return 0; |
| | } |

Extract 10.1: A sample of incorrect answer to question 10 of paper 1

In Extract 10.1, the candidate managed to draw the start and stop symbols but failed to draw correctly the process, input-output and decision symbols in part (a). In part (b), the candidate wrote correct variables and if – condition statement but failed to correct loops.

On the other hand, the candidates (6.36%) who scored average marks (5.5 – 8.5) managed to use correct symbols and statements to draw a flowchart. The candidates were able to draw correct “start” and “stop” symbol,

process as well as input/output symbols but failed to draw and write correct decision statement in part (a). Some of the candidates drew correctly “start” and “stop” symbols, decision symbols and their decision statement but failed to draw and write correct process statement as well as input/output symbols. In part (b), some candidates were able to write variable declaration and initialization and ‘if condition’ correctly but failed to write correct C++ statements for counting and the total number of prime numbers between 1 and 50. This indicates that the candidates had insufficient knowledge of program iteration.

2.2 136/2 Computer Science 2

This was a practical paper which lasted for 3 hours. The paper consisted of 3 questions. Candidates were required to answer 2 questions, including question 1 on C++ programming. Each question carried 25 marks, giving a total of 50 marks.

2.2.1 Question 1: C++ Programming

This was a compulsory question which carried a total of 25 marks. The question consisted of two parts (a) and (b). Candidates were required to use the concept of C++ programming language. The question given to the candidate was as follows:

- (a) In the year 2020, ABC Secondary School expanded its enrollment capacity twice higher than the normal rate. The increase in the number of students made it difficult for manual calculation and creating report of academic performance for each student. Use an array concept to develop a C++ program which prompts the user to enter the number of students, student name and scores for the seven subjects. The program should compute total and average performance for each student.
- (b) The XVDF football Stadium has a total capacity of 200 to accommodate football fans. The stadium manager wants to keep track of the number of attended followers for each match in real time. You are assigned to develop a C++ program that reads gender, counts and displays the number of attended females, males, total followers and the remaining slots. The program must be able to print the message “*sorry the pitch is full*” when the count reaches maximum entries.

A total of 298 (100%) candidates attempted this question, out of whom 125 (41.95%) scored 0 to 8.5 marks, 134 (44.96%) scored 9 to 14.5 marks and 39 (13.09%) scored 15 to 25 out of the 25 marks allocated. Figure 11 illustrates the candidates' performance on this question.

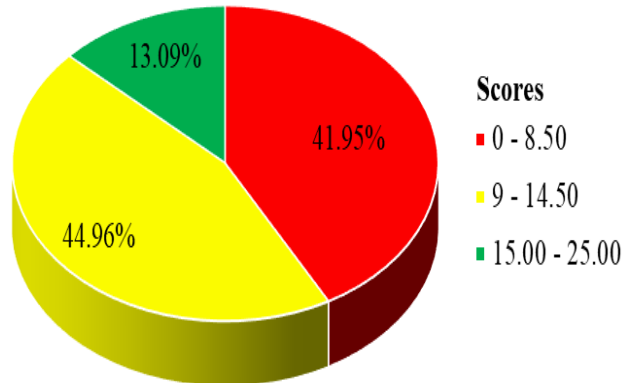


Figure 11: *The Candidates' Performance on Question 1 of Paper 2*

The general candidate's performance of this question was average because 58.05 per cent scored from 9 to 25 marks. The analysis of candidates' responses shows that the candidates (13.09%) who scored high marks managed to write a C++ program using the array concept to prompt the user to enter the number of students, student name and scores for the seven subjects, compute the total and average performance for each student in part (a). However, some of the candidates applied *if statement* and *switch case* to generate the scores for the seven subjects instead of iteration structure. This hindered them from scoring full marks in this part. Other candidates were able to give correct *outer loops* required for a program to prompt the user to enter number of student but they failed to give the *inner loop* required to set the number of scores. Others typed correctly "outer loop" but failed to write the correct loop for displaying iterated student names, student total score and students average scores. This indicates that the candidates had insufficient knowledge of iteration structures in C++ programming. Furthermore, some of the candidates gave the correct outer and inner loops, but limited the number of students to be entered in the loop. This made the program display specific number of students. A few candidates managed to write all correct C++ statements to enter the number of students and names of students but restricted the number of scores for seven subjects.

In part (b), the candidates developed correctly a C++ program that read gender, counted and displayed the number of attended females, males, total followers and showed the remaining slots. However, some of the candidates applied *int main ()* with no return type to start the program. This could hinder the program to run successfully. This shows that candidates failed to differentiate between the uses of *int main ()* and *void main ()*. Other candidates could not type a statement to prompt the user to enter gender type instead they made the program accept input without any prompting message of gender type. This made them lose some marks. Extract 11.1 shows a sample of correct responses to this question.

```
#include<iostream>
#include<string>
using namespace std;
void find(){
    float total=0, avg;
    int subjects[7];
    string stuname;
    cout<<"Enter the student's name"<<endl;
    cin>>stuname;
    cout<<"Enter marks of the student:"<<endl;
    for(int i=0; i<7; i++){
        cin>>subjects[i];
        total=total+subjects[i];
    }
    cout<<"The Sum of marks of "<<stuname<<" is "<<total<<endl;
    avg=total/7;
    cout<<"The Average of marks of "<<stuname<<" is "<<avg<<endl;
    cout<<endl<<endl;
}
int main(){
    int n;
    cout<<"Please enter number of students:"<<endl;
    cin>>n;
    for(int i=0; i<n; i++){
        find();
    }
    return 0;
}
```

```
Please enter number of students:
2
Enter the student's name
ali
Enter marks of the student:
32
90
87
67
65
54
54
The Sum of marks of ali is 449
The Average of marks of ali is 64.1429

Enter the student's name
bausa
Enter marks of the student:
45
65
78
65
78
76
65
The Sum of marks of bausa is 472
The Average of marks of bausa is 67.4286
```

```

#include <iostream>
#include<string>
using namespace std;
int main(){
    string sex;
    int male=0;
    int female=0;
    int remslots=0;
    int total=0;
    for(int i=0;i<200;i++){
        cout<<"Please input 'M' if you are a male and 'F' if you are a female: ";
        cin>>sex;
        if(sex=="F"){
            female=female+1;
        }
        else if(sex=="M"){
            male=male+1;
        }
        else {
            cout<<"Please enter either of the two options only."<<endl<<endl;
            break;
        }
        total=male+female;
        cout<<"Number of attended females is: "<<female<<endl;
        cout<<"Number of attended males is: "<<male<<endl;
        cout<<"Number of total followers is: "<<total<<endl;
        if(total==200){
            cout<<"sorry the pitch is full";
        }
        else if(total<200){
            remslots=200-total;
            cout<<"Number of remaining slots is: "<<remslots;
        }
        cout<<endl<<endl<<endl;
    }
    return 0;
}

```

```

Please input 'M' if you are a male and 'F' if you are a female: M
Number of attended females is: 0
Number of attended males is: 1
Number of total followers is: 1
Number of remaining slots is: 199

Please input 'M' if you are a male and 'F' if you are a female: F
Number of attended females is: 1
Number of attended males is: 1
Number of total followers is: 2
Number of remaining slots is: 198

Please input 'M' if you are a male and 'F' if you are a female:

```

Extract 11.1: A sample of correct response to question 1 of paper 2

Extract 11.1 shows that the candidates managed to use C++ program to prompt a user to enter the number of students, student's names, scores for the seven subjects and to compute total and average performance for each student in part (a). The candidate also managed to write the C++ program that reads gender, counts, displays the number of the attended females, males, total followers and the remaining slots and prints the message "*sorry the pitch is full*" when the count reaches maximum entries in part (b).

Further analysis showed that the candidates (44.97%) who scored average marks managed to write the required C++ statements to prompt users to enter the number of students, students' name and scores of seven subjects but failed to use loop to iterate the student names in part (a). This led the candidates to lose some marks. In part (b), the candidates wrote correct C++ statements that computed the total followers, the remaining slots and print the message "*sorry the pitch is full*" but failed to write C++ statements that reads gender and display the number of attending females and males as required in the question. Some of the candidates failed to declare the variables required in the program. Instead, they used undeclared variables. Others could not set the correct condition in the loop which made the program produce invalid output. Moreover, some candidates wrote the program that prompted the user to enter the number of males and number of females instead of entering the gender type. This implies that the candidate did not understand the question. It was noted that some candidates constructed a program which adds the fixed entered numbers by the user instead of using a loop to count the number of males and females in the pitch.

Statistics show that 41.95 per cent of candidates scored low marks from (0-8.5). The candidates were able to write header files, C++ statements for prompting user to enter number of students, name of the student, scores of seven subjects and return statement but failed to give correct declaration of some variables in part (a). Some of the candidates wrote incorrect iteration structure, formula to compute total and average performance for each candidate. This shows that the candidates had insufficient knowledge on the iteration structure and data types concepts in C++ program. In part (b),

some candidates wrote correctly the header files and return statement but failed to initialize counter variable to 0. Moreover, some candidates applied number to declare gender. They applied number 1 for the female and number 2 for the male instead of defining character data type. Others used wrong applications to type the C++ statements. For example, one candidate used notepad (text editor) instead of the C++ compiler. This shows that the candidate lacked the knowledge of compiler programs which execute, compile and run a program. Furthermore, some candidates typed a C++ program which is contrary to the question. For example, one candidate typed a C++ program to find the inverse of the string “*sorry the pitch is full*” which then reversed to “*lluf si hctip eht yrros*”. This shows that the candidates did not understand the question. Extract 11.2 shows a sample of an incorrect response from one of the candidates.

```

1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      float i[7],average,total=0;
6      cout<<"first subject:";
7      cin>>i[0];
8      cout<<"second subject:";
9      cin>>i[1];
10     cout<<"third subject:";
11     cin>>i[2];
12     cout<<"fourth subject:";
13     cin>>i[3];
14     cout<<"fifth subject:";
15     cin>>i[4];
16     cout<<"sixth subject:";
17     cin>>i[5];
18     cout<<"seventh subject:";
19     cin>>i[6];
20     for(int i=1;i<=7;i++);
21     total=i[0]+i[1]+i[2]+i[3]+i[4]+i[5]+i[6];
22     cout<<"toatl of subject is= "<<total<<endl;
23     average=total/7;
24     cout<<"Average marks is= "<<average<<endl;
25     return 0;
26 }

```

```

first subject:5
second subject:7
third subject:8
fourth subject:9
fifth subject:8
sixth subject:7
seventh subject:6
toatl of subject is= 50
Average marks is= 7.14286

```

```

1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int a,b,c,males,females;
6      cout<<"press 1 to read male"<<endl;
7      cin>>males;
8      cout<<"press 2 to read female"<<endl;
9      cin>>females;
10     cout<<"enter no of female"<<endl;
11     cin>>a;
12     cout<<"enter no of males"<<endl;
13     cin>>b;
14     c=a+b;
15     cout<<"total number attended on the stadium"<<endl;
16     cout<<"sorry the pitch is full"<<endl;
17     return 0;
18 }

```

```

press 2 to read female
6
enter no of female
4
enter no of males
5
total number attended on the stadium
sorry the pitch is full

```

Extract 11.2: A sample of an incorrect response to question 1 in paper 2

In Extract 11.2 the candidate failed to use loop in C++ program to display names of students and score of seven students instead of entering scores of seven subjects manually in part (a). In part (b), the candidate failed to write C++ program to display the number of females, males, the remaining slots and total followers. The candidate also declared gender as *Integer* instead of *char* data type.

2.2.2 Question 2: Website Development

This was an optional question, which carried a total of 25 marks. The question was in two parts (a) and (b). Candidates were required to use the concept html codes and JavaScript function to complete the task. The question given to the candidate was as follows:

- (a) The director at Open Mind nursery school wants to develop the system that will assist teachers to demonstrate the concept of vowels present in different names. The teachers also had challenges in counting the number of vowels in the names presented. You have been asked to develop a JavaScript function that will prompt students to enter the name in small letters and count the number of vowels present when the user clicks the button OK. Use the message box given in the following Figure to accomplish the task.

Write Your Name in Small Letters

OK Cancel

- (b) The Wakwetu SACCOS offers different types of loans to its members with annual interest rate of 12% per year. A member may request the loan with desired amount to be repaid within the period requested. The SACCOS management is in need of a program to manage the loan processing;
- (i) Design an interface using HTML which will enable the SACCOS treasury to enter the loan amount, interest rate and repayment period in years.
 - (ii) Automate the interface with JavaScript such that, both the treasury and a member would get the loan repayment schedule upon when they click on the button “Loan Statement” as indicated in the following Figure.

Wakwetu SACCOS

Calculates loan repayment period

Loan Amount:

Period(years):

Interest Rate(%):

A total of 275 (92.3%) candidates attempted this question, out of whom 216 (78.55%) scored 0 to 8.5 marks, 47 (17.09%) scored 9 to 14.5 marks and 12 (4.36%) scored 15 to 25 marks out of 25 marks allocated. The general performance of candidates on this question was weak as 78.09 per cent of the candidates scored below 9 marks. Figure 12 represents the candidate's performance on this question.

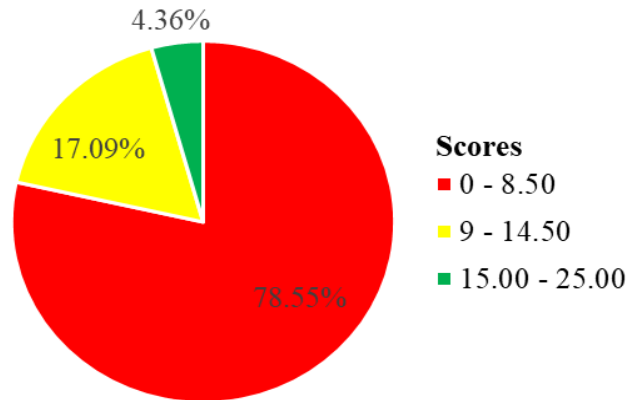


Figure 12: *The Candidates' Performance on Question 2 of Paper 2*

The analysis shows that 78.55 per cent who scored low marks wrote HTML open and close tags but failed to include any elements. Other candidates wrote HTML tags with an incorrect syntax. Most of the candidates did not write JavaScript codes and others were not able to save the document as an HTML file. Moreover, most of the candidates managed to open the JavaScript tag but failed to close the tag in part (a). In part (b), most of the candidates managed to design the interface form Wakwetu SACCOS but failed to activate the form to follow the instructions given. This shows that the candidates lacked knowledge of JavaScript Language in both parts (a) and (b). Extract 12.1 shows a sample of an incorrect response from one of the candidates.


```

1 <html>
2 <head>Write your name in small letters</head>
3 <p>
4 <title>
5 <boggy bgcolor="silver">
6 <form>
7 <write your name in small letters>
8 <br>
9 </body>
10 </html>

```

Write your name in small letters

```

1 <doctype>html
2 <head>
3 <Title>
4 <html>
5 <head><h1>Wakwetu Saccos<hi>
6 </head>
7 <title><h2>calculate loan repayment period<h2>
8 </title>
9 <body><size="10"width="10" >
10 <=input type=text name"loan Amaunt"=checkbox>
11 input type=text name"period(years)"=checkbox>
12 input type=text name"interest rate(%)"=checkbox>
13 input type=text name""=checkboxplaceholder>
14 </body>
15 </html>

```

html <=input type=text name"loan Amaunt"=checkbox> input type=text name"period(years)"=checkbox> input type=text name"interest rate(%)"=checkbox> input type=text name""=checkboxplaceholder>

Wakwetu SACCOS

Calculates loan repayment period

Loan Amount:

Period(years):

Interest Rate(%):

Loan repayment schedule:

Monthly payment will be:

Payment in total will be:

Extract 12.1 A sample of an incorrect response to question 2 of paper 2

In Extract 12.1, the candidate managed to type only the codes to initiate HTML page but failed to design a message box for entering a name and counting the number of vowels in the present name in part (a). The candidate also, managed only to initiate HTML page but failed to write the codes with the correct syntax and design a program to manage loan processing in part (b).

Moreover, 17.09 per cent of the candidates who scored average marks were able to create a prompt box using JavaScript in part (a). However, some candidates failed to create the message box using JavaScript. For example, one of the candidates wrote; HTML table tags to create the message box as;

```
<table border="1" width="500" height="200">  
<tr>  
<td>  
<p>Write Your Name in Small Letters</p>
```

This shows that the candidate had knowledge on tables but lacked the concept of prompt box. Moreover, some of the candidates failed to write the correct functions and conditions to count the number of vowels of the entered names. In part (b), the candidates managed to design an interface using HTML tags, open tag for JavaScript and to declare variables. Also, they failed to relate the required formula for simple interest. Moreover, some candidates failed to change the declared variables into integers and create the button by involving relevant functions. This shows that the candidate had inadequate knowledge of JavaScript codes. A few candidates used cascading style sheet (CSS) instead of the JavaScript language, which indicates that the candidate did not understand the question.

On the other hand, some of the candidates (4.36 %) who scored high marks managed to design a web page containing a message box using HTML and JavaScript codes which count and display the number of vowels of the entered name in part (a). However, some of the candidates failed to put a condition to restrict the counting of vowels in capital and small letters. For example, one candidate typed “var vowel list = 'aeiouAEIOU';”. The candidate failed to exclude capital letters in counting vowels. In part (b), the candidates managed to design the interface which enabled them to receive user inputs such as loan amount (P), interest rate(R) and time in

years (T) and to create functions and conditions which enabled a user to view the loan repayment schedule by clicking on the Loan statement button using HTML and JavaScript codes. They also wrote the formula to calculate interest but they failed to write the formula for calculating monthly amount for each month. For example, some of the candidates wrote; “loanrepayment = amount (rate (1+rate) ^n) /((1+rate)^n -1);” as the formula for calculating the monthly amount. This shows that the candidates did not understand the question, which made them lose some marks. Extract 12.2 shows a sample of a correct response from one of the candidates in this question.

```

2  <html>
3  <head>
4    <title>Open Mind nursery school</title>
5  </head>
6  <body>
7    <script type="text/javascript">
8
9    //These are the vowels to be counted on the input.
10   const vowels = ["a", "e", "i", "o", "u"]
11
12   function countVowel(str) {
13
14     var count = 0;
15
16     //This loop passes through each character to see if it's a vowel.
17     for (let letter of str.toLowerCase())
18     {
19       if (vowels.includes(letter))
20       {
21         count++;
22       }
23     }
24
25     return count
26   }
27
28   //Taking input from the student.
29   const name = prompt(' Write Your Name in Small Letters ');
30   const result = countVowel(name);
31   document.write(result + " vowels " + " are in your name. ");
32
33   </script>
34
35 </body>
36 </html>
37

```

This page says

Write Your Name in Small Letters

OK Cancel

2 vowels are in your name.

```

1 <html>
2 <head><title>Wakwetu SACCOS</title></head>
3 <center>
4 <fieldset style="margin: 250px;" >
5
6 <form name="wakwetu">
7
8 <h1>Wakwetu SACCOS</h1>
9 <h2>Calculates loan repayment period</h2>
10
11 Loan Amount:<input type="text" name="principal" id="l" onchange="loan();"><br><br>
12 Period(years):<input type="text" name="years" id="p" onchange="loan();"><br><br>
13 Interest Rate(%):<input type="text" name="interest" id="i" onchange="loan();"><br><br>
14
15 <input type="button" value="Loan statement" onclick="loan();">
16
17 <br><br>
18 <b><u>Loan repayment schedule:</u></b><br><br>
19
20 Monthly payment will be:<input type="text" name="payment"><br><br>
21 Payment in total will be:<input type="text" name="total" >
22
23 </form>
24 </fieldset>
25 </center>
26
27 <script language="JavaScript">
28
29 function loan() {
30     var principal = document.wakwetu.principal.value;
31     var interest = document.wakwetu.interest.value / 100 / 12;
32     var payments = document.wakwetu.years.value * 12;
33
34
35     var calc = Math.pow(1 + interest, payments);
36     var monthes = (principal*calc*interest)/(calc-1);
37
38
39     if (!isNaN(monthes) &&
40         (monthes != Number.POSITIVE_INFINITY) &&
41         (monthes != Number.NEGATIVE_INFINITY)) {
42         document.wakwetu.payment.value = round(monthes);
43         document.wakwetu.total.value = round(monthes * payments);
44     }
45
46     else {
47         document.wakwetu.payment.value = "";
48         document.wakwetu.total.value = "";
49     }
50 }
51
52 function round(calc) {
53     return Math.round(calc*100)/100;
54 }
55
56 </script>
57 </body>
58 </html>

```

Wakwetu SACCOS

Calculates loan repayment period

Loan Amount:

Period(years):

Interest Rate(%):

Extract 12.2: A sample of correct response to question 2 of paper 2

In Extract 12.2 the candidate managed to use HTML and JavaScript codes to design a prompt box (message box) for entering a name and counting the number of vowels present in the name in part (a). In part (b), the candidate managed to integrate HTML and the JavaScript codes to design program to manage the loan processing.

2.2.3 Question 3: Visual Programming

This was an optional question, which carried a total of 25 marks. The question intended to measure the ability of the candidates on how to design the interface and link that interface with the database using Visual Basic Programming and Microsoft Access as database respectively. The question given to the candidate was as follows:

Mwambe High School is facing the problem of tracking the movement of books in its Library. The library contains 250,000 of reference books with a large number of borrowers. The librarian manages the registration of new books, borrowed books and returned books manually which leads to redundancies of the data and even inconsistency of the recorded information. The analyst came up with many system interfaces among which are presented in Figures 3, 4 and 5. The school director intends to design a computerized library management system in order to improve service delivery in the library. Using a Visual Basic Program;

- (a) Create interfaces shown in Figure 3.

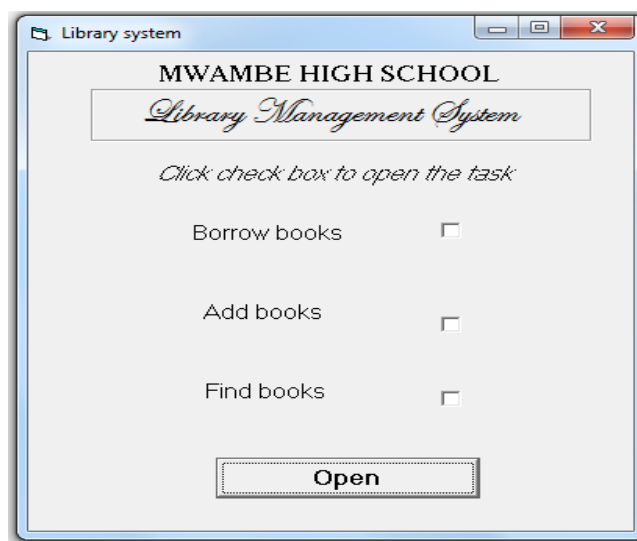


Figure 3: Home page

- (b) Activate the button “Open” together with checkbox “Borrow books” in Figure 3 so that when the librarian clicks the “Open” button the new form “Borrow Book” given in Figure 4 will open.

| Student Number | Book Number | Publisher Name | Year Published | Title |
|----------------|-------------|----------------|----------------|--------------------|
| 1020 | XY12 | longhorn | 2006 | HTML |
| 1130 | AB76 | Corialis group | 2000 | Visual Basic 6 |
| 2300 | PG56 | Firewall media | 2009 | Information system |

Figure 4: Borrow Book Form

- (c) Reactivate the button “Open” by activating the checkbox “Add books” in Figure 3 so that when the librarian clicks on “Open” button the new form “Add Books” given in Figure 5 will open.

Book Number: XY12

Title: HTML

Publisher Name: longhorn

Year Published: 2006

AddBooks Clear

| Book Number | Title | Publisher Name | Year Published |
|-------------|--------------------|----------------|----------------|
| XY12 | HTML | longhorn | 2006 |
| AB76 | Visual Basic 6 | Corialis group | 2000 |
| PG56 | Information system | Firewall media | 2009 |

Navigation: [Left Arrow] [Right Arrow] [Search Box]

Figure 5: Add Book Form

- (d) Reactivate the button “Open” by activating the checkbox “Find books” in Figure 3 so that the message “Enter the name of the book you are looking for” will appear in the message box when the Librarian clicks the “Open” button.
- (e) Activate the combo box in Figure 4 to display years in numbers.
- (f) Create a database named LibraryDB using Ms-access. Add two tables “BorrowBooks” as displayed in Figure 4 and “AddBooks” as displayed in Figure 5.
- (g) Activate the buttons in Figure 4 so that a user should;
 - (i) Click the button “Exit” to exit the form.
 - (ii) Click the button “Send” to send data from the form to the database and
 - (iii) Click the button “Clear” to reset the form data.

This question was attempted by few candidates where 23 (7.7%) of the candidates were able to attempt the question correctly. Among those who performed this question 8 (34.78%) scored 0 to 8.5 marks, 3 (13.04%) scored from 9 to 14.5 marks and 12 (52.17%) scored 15 to 25 marks out of the 25 marks allocated. The overall performance on the question was good as 65.22 per cent scored above 14.5 marks. Figure 13 illustrates the candidates' performance on this question.

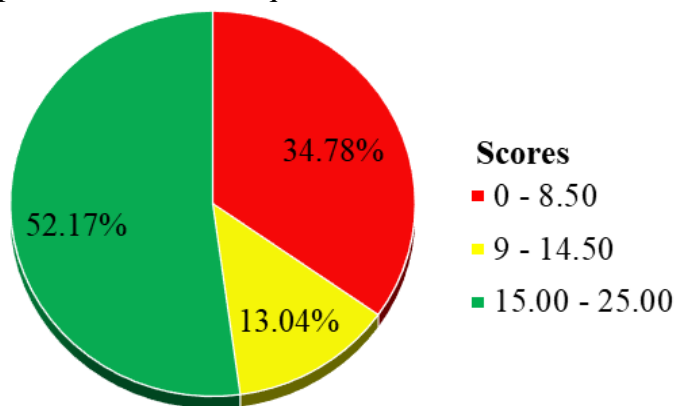


Figure 13: *The Candidates' Performance on Question 3 of Paper 2*

The analysis shows that 52.17 per cent of the candidates who scored higher marks (15-25) managed to design correctly all forms, activate all buttons in the form using visual basic codes and link all forms to the database created. These candidates were able to add data grid view in the form to display information from the database but failed to populate the combo box for displaying years and created the message box. Moreover, they failed to write the correct code for adding data to database. For example, one candidate wrote `Adodc.Recordset.Update` instead of writing `Adodc.Recordset.AddNew`. Hence the data was not added to the database. Instead, it was updated. This made them lose some marks. Extract 13.1 shows a sample of the correct response to question 3 of paper 2.

Library system

MWAMBE HIGH SCHOOL

Library Management System

Click check box to open the task

Borrow books ☐

Add books ☐

Find books ☐

Open

Project1 - Form1 (Code)

Command1 Click

```
Private Sub Command1_Click()  
Dim a As String  
If Check1.Value = 1 Then  
Form2.Visible = True  
ElseIf Check2.Value = 1 Then  
Form3.Visible = True  
ElseIf Check3.Value = 1 Then  
a = MsgBox("Enter the name of the book you are looking for")  
End If  
End Sub
```

Form2

Student Number: 1020

Book Number: 1000

Publisher Name: longhorn

Year Published: 2011

Title: HTML

Send Clear Exit

| Student Number | Book Number | Publisher Name | Year Published | Title |
|----------------|-------------|----------------|----------------|-------------------|
| 1020 | 1000 | longhorn | 2006 | HTML |
| 1130 | 2000 | Corialis group | 2000 | Visual Basic 6 |
| 2300 | 3000 | Firewall media | 2009 | Information syste |

Navigation buttons: < << >> >

Project1 - Form2 (Code)

(General) (Declarations)

```

Private Sub Command1_Click()
    Adodc1.Recordset.AddNew
End Sub

Private Sub Command2_Click()
    Text1.Text = ""
    Text2.Text = ""
    Text3.Text = ""
    Text4.Text = ""
End Sub

Private Sub Command3_Click()
    Unload Me
End Sub

Private Sub Form_Load()
    Comb01.AddItem "2006"
    Comb01.AddItem "2000"
    Comb01.AddItem "2009"
End Sub

```

The image shows a VBA form titled "Add Books" and its corresponding code in the "Project1 - Form3 (Code)" window.

Form Interface:

- Book Number: XY12
- Title: HTML
- Publisher Name: Longhon
- Year Published: 2006
- Buttons: AddBooks, Clear

Code:

```

Private Sub Command1_Click()
    Adodc1.Recordset.AddNew
End Sub

Private Sub Command2_Click()
    Text1.Text = ""
    Text2.Text = ""
    Text3.Text = ""
    Text4.Text = ""
End Sub

```

Extract 13.1: A sample of correct responses to question 3 of paper 2

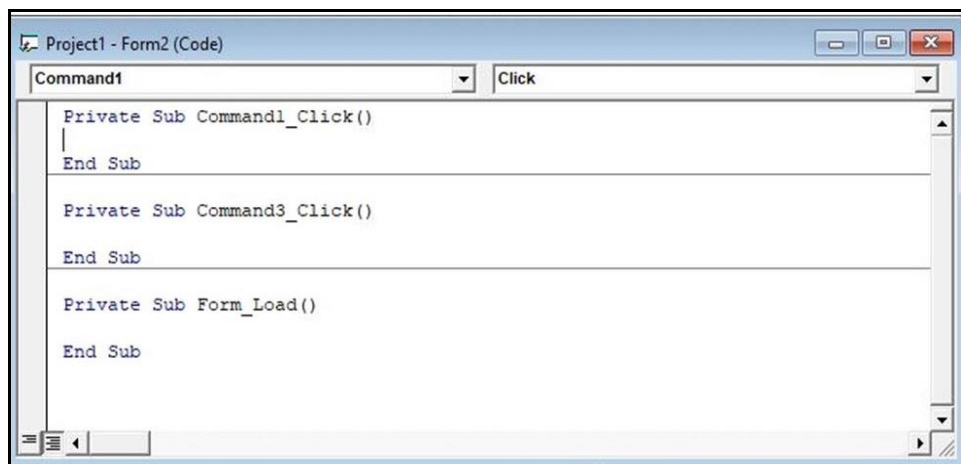
In Extract 13.1 the candidate managed to design the required interface with the correct Visual Basic codes for activating all buttons and combo box that displayed the year populated.

Conversely, the candidates (13.04%) who scored average marks (9-14.5) were able to create forms with the stated controls and manage to activate some buttons by using visual basic codes in all parts of the question. These candidates managed to create the database with tables having the required field name and appropriate data type. Also, they were able to create data grid view in the form of displaying information from the database. However, the candidates failed to write visual basic codes to activate the 'addbook' and 'send' button to send data from the form to the database created. This indicates that the candidates had insufficient knowledge on how to connect Visual basic and database.

In addition, 34.78 per cent of the candidates who scored low marks from 0 to 8.5 marks were able to design an interface with fewer Visual Basic controls like text box, checkbox, combo box and command buttons using visual basic elements but failed to activate most of the controls. The candidates managed to write commands to exit the program, clear data on the textbox and send data to the database, but failed to add the grid view that displays data from the database. Some candidates managed to create the database with tables but failed to include the required field name with appropriate data type. Also, some of the candidates managed to design interface by using html tags instead of Visual Basic and others managed to create the required forms but they failed to rename those forms as instructed. This implies that the candidates did not understand the question. Extract 13.2 shows a sample of an incorrect answer from this question.



The screenshot shows a Windows-style window titled "Form2". Inside the window, there is a data entry form. On the left side, there are five labels: "Student name", "Book Number", "Publisher Name", "Year Published", and "Tittle" (note the spelling). To the right of each label is a text box. Below these text boxes, there are three command buttons labeled "Send", "Clear", and "Exit". At the bottom of the form, there is a single, wide text box.



Extract 13.2: A sample of incorrect responses to question 3 of paper 2

In Extract 13.2, the candidate managed to design the required interface although, the candidate failed to add visual basic codes to activating buttons like send, clear and exit. Also, the candidate failed to add comb box to populate years and grid view to display information from the database.

3.0 PERFORMANCE OF THE CANDIDATES PER TOPIC

The analysis done in relation to each topic shows that the candidates performed well on one topic, average on four topics and weak on five topics. The candidates performed well on the topics on *Information System* (69.90%). The good performance was a result of correct interpretation of the questions and the candidates' good practical skills. The candidates' performance was average on the topics on *IT and Environment* (57.72%), *Website Development* (44.12%), *Visual Programming* (41.34%) and *C++ Programming* (35.4%). This performance was due to inadequate knowledge on the concepts taught under this topic. The candidates' performance was weak on the question based on *Data Communication and Networking* (31.63%), *Data Representation* (18.46%), *Computer Security and Privacy* (16.11%), *Problem Solving* (6.36%) and *Computer Basics* (4.7%). The weak performance on these topics is attributed to the candidate's lack of practical skills on the topics. The *Appendix* shows the performance of the candidates on each topic.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The analysis of candidates' performance on Computer Science in ACSEE 2022 has shown that, out of the 10 topics examined, 1 topic had good performance, 4 topics had average performance and 5 topics had weak performance. Therefore, the overall performance on Computer Science in 2022 was weak. The analysis of the candidates' responses indicated that, the candidates had difficulties in answering questions from the topics on *Data Communication and Networking*, *Data Representation*, *Computer Security and Privacy*, *Problem Solving* and *Computer Basics*. The weak performance on the five topics is attributed to the candidates' insufficient knowledge and skills. They also lacked skills about the tested concepts and wrong interpretation of the given information.

4.2 Recommendations

In order to improve the candidates' performance on the future Computer Science examination, the following are recommended:

- (a) Teachers should guide the students to work on the section of Boolean Algebra and Logic gates as that was among the weakly performed topics.
- (b) Teachers should put emphasis on various devices used to create different types of networks since that demonstrated weak performance.
- (c) Teachers should provide students with various methods of storing and transmitting data and information in computer communication more securely.
- (d) Teachers should put emphasis on guiding students to practice writing pseudocodes and algorithms. In addition, students should practice to use flowchart symbols to prepare flowcharts and write C++ codes based on those flowcharts.
- (e) It is further recommended that students should be given more exercises and tests to improve their skills in creating database by applying all the important features for both theoretical concepts and practical skills in using the Ms access.

APPENDIX

Analysis of Candidates' Performance per Topic

| S/N | Topic | Number of Questions | Percentage of Candidates who Scored 35% or Above | Remarks |
|-----|-----------------------------------|---------------------|--|---------|
| 1 | Information Systems | 1 | 69.90 | Good |
| 2 | IT Environment | 1 | 57.72 | Average |
| 3 | Website Development | 2 | 44.12 | Average |
| 4 | Visual Programming | 2 | 41.34 | Average |
| 5 | C++ Programming | 2 | 35.4 | Average |
| 6 | Data Communication and Networking | 1 | 31.63 | Weak |
| 7 | Data Representation | 1 | 18.46 | Weak |
| 8 | Computer Security and Privacy | 1 | 16.11 | Weak |
| 9 | Problem Solving | 1 | 6.36 | Weak |
| 10 | Computer Basics | 1 | 4.7 | Weak |

