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), 2021

COMPUTER SCIENCE

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136 COMPUTER SCIENCE

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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, Advanced Certificate of Secondary Education Examination (ACSEE) 2021. 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 2021 Computer Science Examination was average as 41.3 per cent of the candidates passed. The analysis of performance on each topic shows that, the candidates had good performance in two topics, average performance in three topics and weak performance in four topics which were C++ Programming, Data Communication and Networking, Visual Programming and Data Structure and Algorithm. The average performance in this subject is attributed to the candidates' lack of practical skills.

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

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

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report provides the analysis of the candidates' performance on the Advanced Certificates of Secondary Education Examination (ACSEE) Computer Science subject 2021. The examination assessed knowledge and the competences acquired by the candidates at the Advanced Level of secondary education.

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

A total of 310 candidates sat for the Computer Science examination in 2021. Out of these, 187 (60.52%) passed the examination and 123 (39.48 %) failed. In 2020, a total of 39 candidates sat for the Computer Science examination, of these candidates, 32 (82.05%) passed and 7 (17.95 %) failed. This means that there is a decline in performance by 21.53 per cent in 2021.

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 being presented. The candidates' performance on each question/topic is categorized using the ranges of 0 to 34 (poor performance), 35 to 59 (average performance) and 60 to 100 (good performance). These intervals stand for the per centage 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 poor performance, yellow colour for average performance and green colour for good performance. Finally, the report provides the conclusions and recommendations.

2.0 ANALYSIS OF THE CANDIDATES' RESPONSE PER QUESTION

2.1 136/1 Computer Science 1

2.1.1 Question 1: Computer Basics

In this question, the candidates were required to;

(a) differentiate utility software from operating system.

(b) state four factors to be considered when choosing an operating system.

(c) describe four functions of the Control Unit in the Central Processing Unit (CPU).

A total of 310 (100%) candidates attempted this question, out of whom 109 (35.2%) scored from 0 to 3 marks, 97 (31.3%) scored 3.5 to 5.5 marks and 104 (33.5%) scored 6 to 10 marks out of 10 marks allocated. Figure 1 illustrates the candidates' performance in this question.

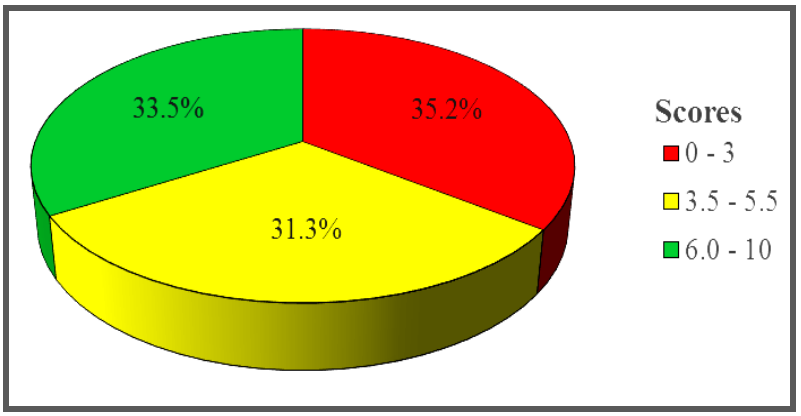
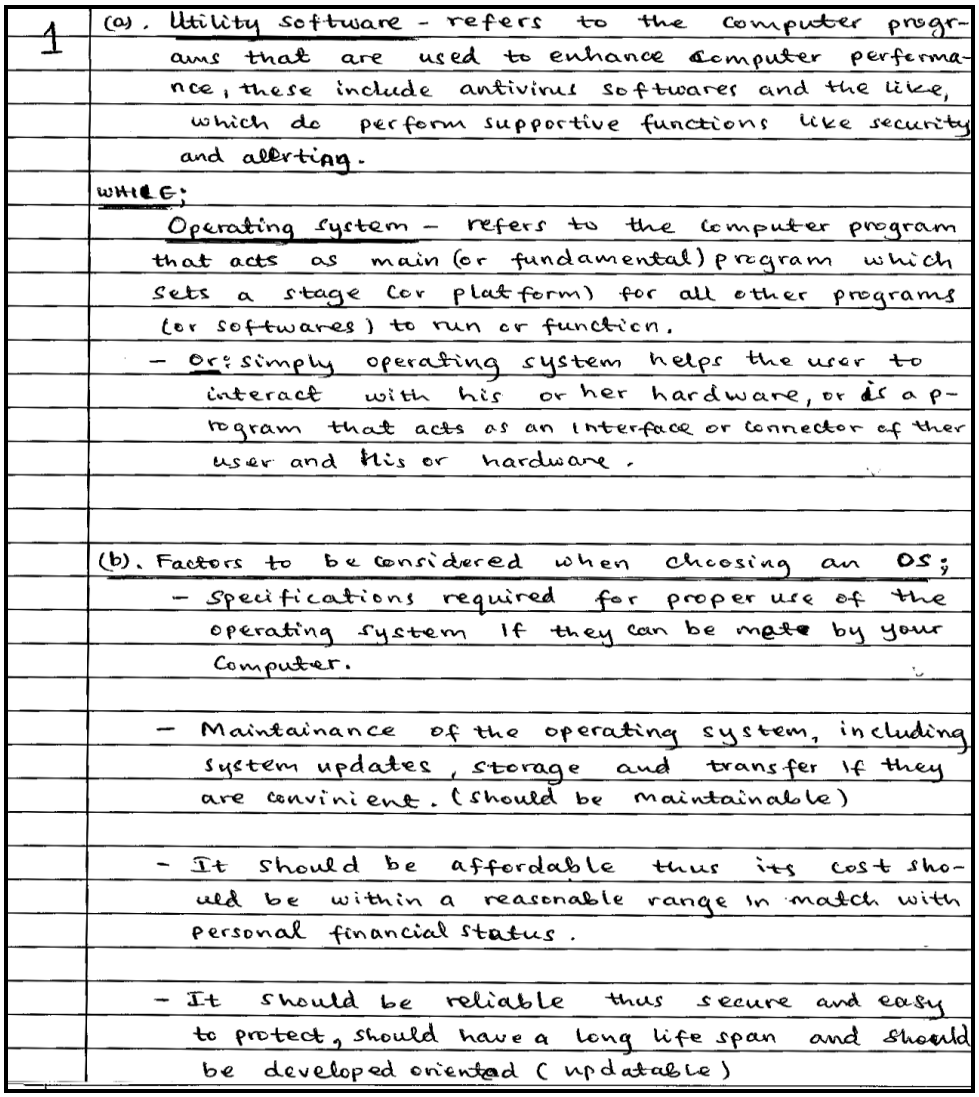


Figure 1: *The candidates' performance on question 1 of paper 1.*

The general performance was good because 64.8% of the candidates scored 3.5 marks or above. The analysis shows that; 34 per cent of the candidates were able to score high marks ranging from 6.0 to 10. The candidates managed to differentiate utility software from operating system in part (a). Some of the candidates explained the meaning of "operating system" but failed to explain the term "utility software". Other candidates wrote the meaning of application software instead of utility software. In part (b), the candidates gave correct factors to be considered when choosing operating system. However, some of them gave only three

correct factors to be considered when choosing an operating system instead of four factors. Moreover, the candidates gave correct functions of the control unit in the Central Processing Unit in part (c). Other candidates wrote correctly three functions of Control Unit with function of another part of CPU. For example, one candidate wrote; *to perform all calculation and logic operation in the CPU,* which is the function of ALU and not CU in CPU. This led them to lose marks. Extract 1.1 represents a sample of a good response.



1

(a). Utility software - refers to the computer programs that are used to enhance computer performance, these include antivirus softwares and the like, which do perform supportive functions like security and alerting.

WHERE;

Operating system - refers to the computer program that acts as main (or fundamental) program which sets a stage (or platform) for all other programs (or softwares) to run or function.

- Or: simply operating system helps the user to interact with his or her hardware, or is a program that acts as an interface or connector of ther user and his or hardware.

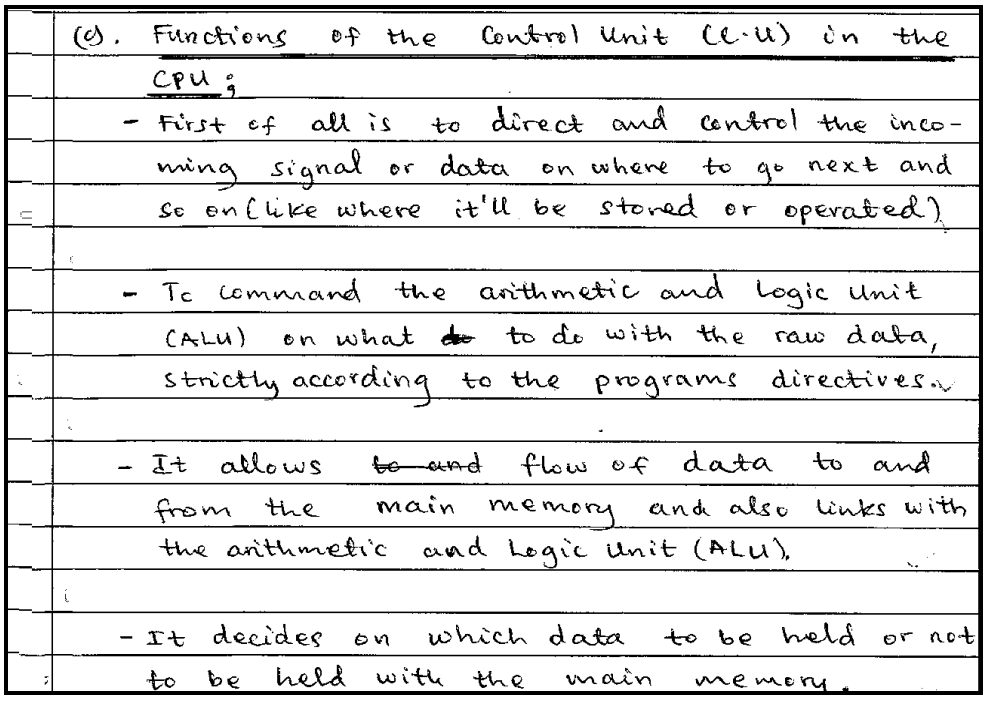
(b). Factors to be considered when chcosing an OS;

- Specifications required for proper use of the operating system if they can be mate by your Computer.

- Maintainance of the operating system, including system updates, storage and transfer if they are convinient. (should be maintainable)

- It should be affordable thus its cost should be within a reasonable range in match with personal financial status.

- It should be reliable thus secure and easy to protect, should have a long life span and should be developed oriented (updatable)


(c). Functions of the Control Unit (C.U) in the CPU;

- First of all is to direct and control the incoming signal or data on where to go next and so on (like where it'll be stored or operated)

- Tc command the arithmetic and logic unit (ALU) on what ~~do~~ to do with the raw data, strictly according to the programs directives.

- It allows ~~to and~~ flow of data to and from the main memory and also links with the arithmetic and Logic Unit (ALU).

- It decides on which data to be held or not to be held with the main memory.

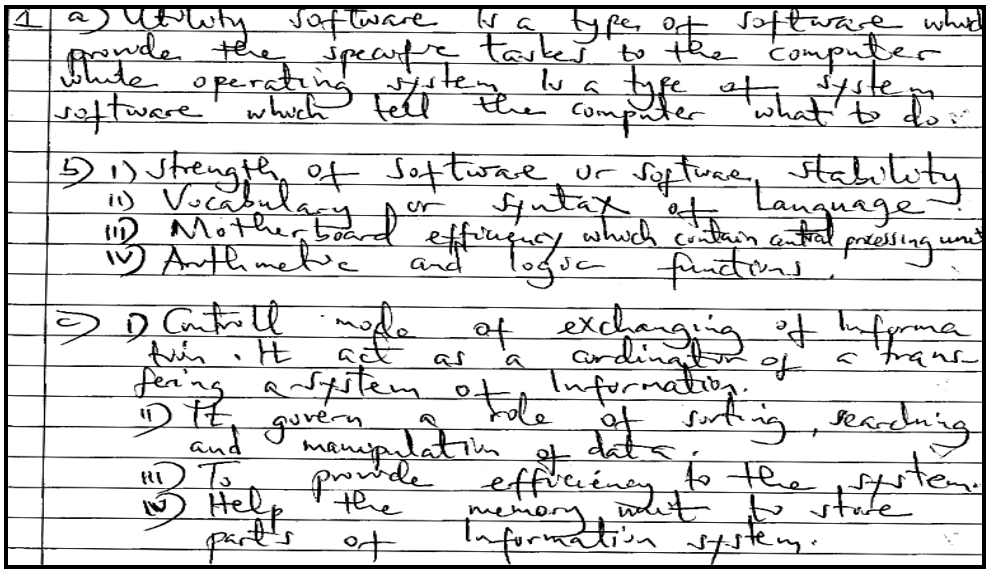
Extract 1.1: A sample of correct answer to question 1 of paper 1.

In extract 1.1, the candidate managed to differentiate utility software from operating system and stated correctly the factors to be considered when choosing an operating system. The candidate also gave correct functions of the Control Unit in the Central Processing Unit (CPU).

The candidates (31.3%) who scored average marks gave a few correct factors to be considered when choosing an operating system in part (b), and wrote correctly some of the functions of the control unit in the CPU in part (c). However, they failed to differentiate utility software from system software in part (a). Some of the candidates described correctly only two functions of the Control Unit in the CPU but failed to describe other functions. This led them to lose some marks in this part. Similarly, some candidates managed to give one or two factors to be considered when choosing an operating system instead of four factors. It was noted that some of the candidates wrote factors to be considered when purchasing a computer. For example, one candidate wrote; *cost of the computer* and *portability of the computer* as factors to be considered when choosing an operating system. This indicates that the candidate did not understand the requirements of the question. Furthermore, some candidates described the

function of the Control Unit as a storage part of a computer instead of being the processing part. For example, one candidate wrote; *Control Unit can provide temporary storage of data*. This indicates that the candidate failed to differentiate computer parts from their functions.

Further analysis shows that 33.5 per cent of the candidates scored low marks (0 to 3). The candidates failed to differentiate utility software from operating system in part (a). Some of the candidates mentioned irrelevant software instead of giving the meaning of utility software. It was noted that some of the candidates managed to write only one factor to be considered when choosing an operating system in part (b). The analysis reveals that there were candidates who wrote functions of the operating system instead of factors to be considered when choosing the operating system. For example, one candidate wrote; *it manages file and folder, it manages memory*. This shows that the candidate did not understand the requirements of the question. Likewise, some of the candidates gave only one correct function of the Control Unit and other incorrect functions in part (c). The analysis shows that there were candidates who gave general functions of CPU instead of the Control Unit. For example, one of the candidates wrote; *Control Unit is a brain of a computer* which signifies insufficient knowledge of the parts of CPU and their functions. Extract 1.2 provides a sample of such incorrect responses.


1 a) Utility software is a type of software which provide the specific tasks to the computer while operating system is a type of system software which tell the computer what to do.

b) i) Strength of software or software stability
ii) Vocabulary or syntax of language.
iii) Motherboard efficiency which contain central processing unit
iv) Arithmetic and logic functions.

c) i) Control mode of exchanging of information. It act as a cordinator of a transfering a system of information.
ii) It govern a role of sorting, searching and manipulation of data.
iii) To provide efficiency to the system.
iv) Help the memory unit to store parts of information system.

Extract 1.2: A sample of an incorrect answer to question 1 of paper 1.

In extract 1.2, the candidate managed to describe correctly one function of control unit in the Central Processing Unit (CPU). However, the candidate failed to differentiate utility software from an operating system. In addition, the candidate was unable to write factors to be considered when choosing an operating system. The candidates also failed to describe functions of Control Unit in the Central Processing Unit (CPU).

2.1.2 Question 2: Data Communication and Networking

In this question, the candidates were required to: - (a) explain briefly the demodulation process, (b) explain the following terms as used in data communication; (i) Bandwidth (ii) Baseband signal (iii) Broadband transmission and (iv) Attenuation and (c) to describe the three modes of data communication with examples.

A total of 310 (100%) candidates attempted this question. Out of whom 230 (74.2%) scored from 0 to 3 marks, 60 (19.3%) scored 3.5 to 5.5 marks and 20 (6.5%) scored 6 to 10 marks out of 10 marks allocated. Figure 2 illustrates the candidates' performance on this question.

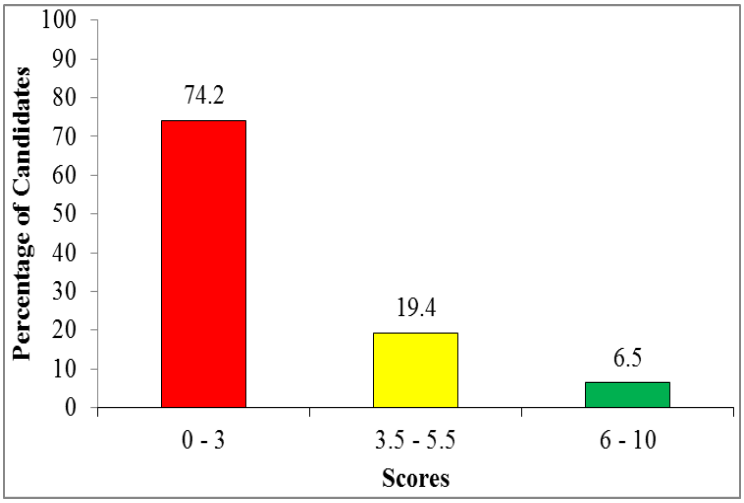


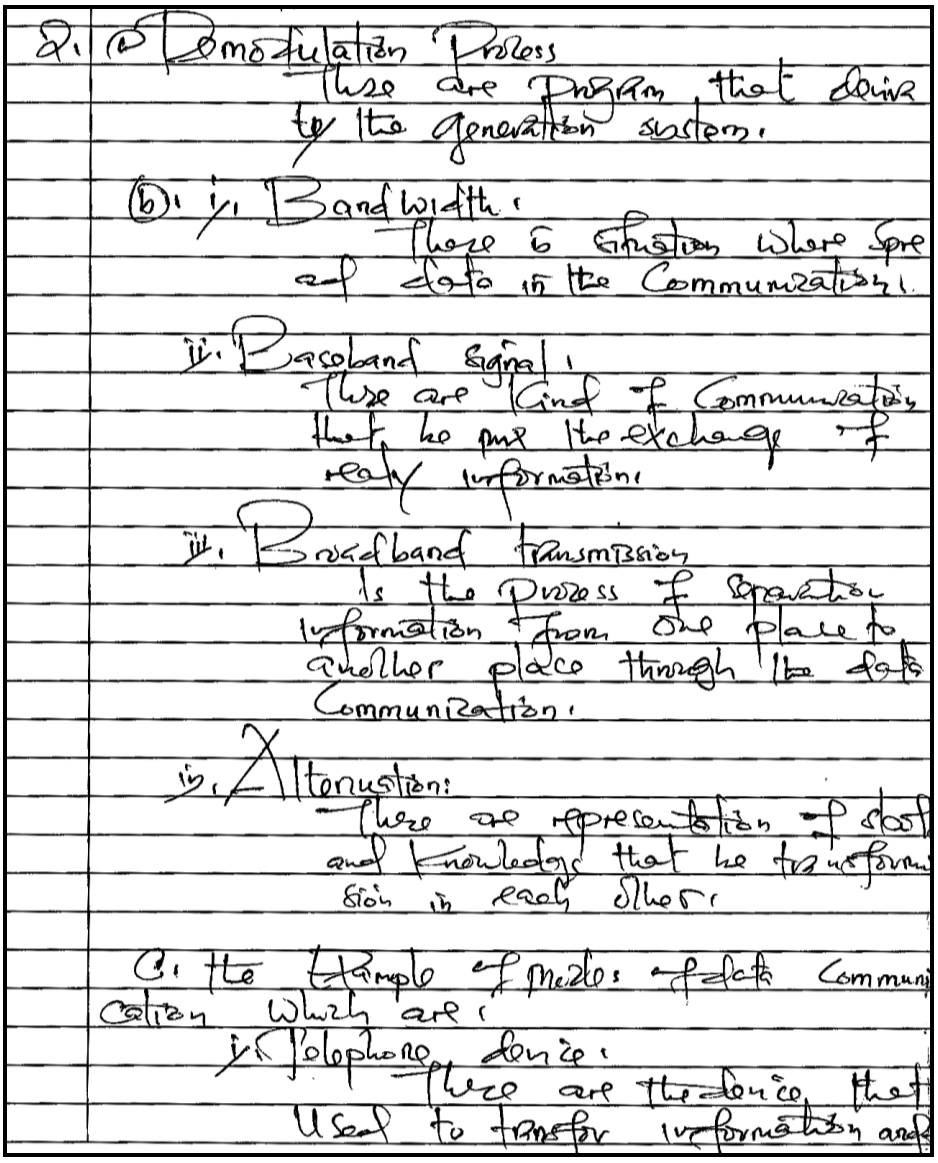
Figure 2: *The candidates' performance on question 2 of paper 1.*

The general performance on this question was poor because 74.2 per cent of the candidates scored low marks (0 - 3). The candidates failed to explain demodulation process in part (a). Some of the candidates explained the meaning of "modulation process" instead of

“demodulation process”. For example, one candidate wrote; *demodulation is the process of converting digital signal to analogy signal*. This signifies that the candidates had inadequate knowledge of data communication concept. In part (b), majority of the candidates failed to explain the terms “bandwidth”, “baseband signal”, “broadband transmission”, and “attenuation”. However, some of the candidates managed to explain the term bandwidth but failed to explain the meaning of other terms as they are applied in data communication. Other candidates gave direct translation of the terms instead of providing the meaning of those terms. For example, one candidate wrote; *Broadband transmission is the transmission of a signal in a given media whose bandwidth is large*. This indicates that the candidates had insufficient knowledge of Broadband transmission.

The analysis of data shows that, a few candidates managed to explain the term “attenuation” as used in data communication. In part (c), some candidates explained the components of information dissemination like sender, medium and receiver instead of modes of data communication. Other candidates described the components of computer operations instead of modes of data communication. For example, one of the candidates wrote three modes of data communication as; *input data, processing data and output data communication*.

Moreover, some of the candidates failed to differentiate between the type of data and modes of data communication. For example, one of the candidates wrote; *modes of data communications are analogy data, digital data and hybrid data communication*. This signifies that the candidate did not understand the requirement of the question. Generally, all candidates who scored low marks lacked knowledge of Data Communication and Computer Networking. However, a few of these candidates mentioned correctly at least one mode of data communication but failed to explain and give their examples. This led them to score low marks. Extract 2.1 presents a sample of such incorrect responses.

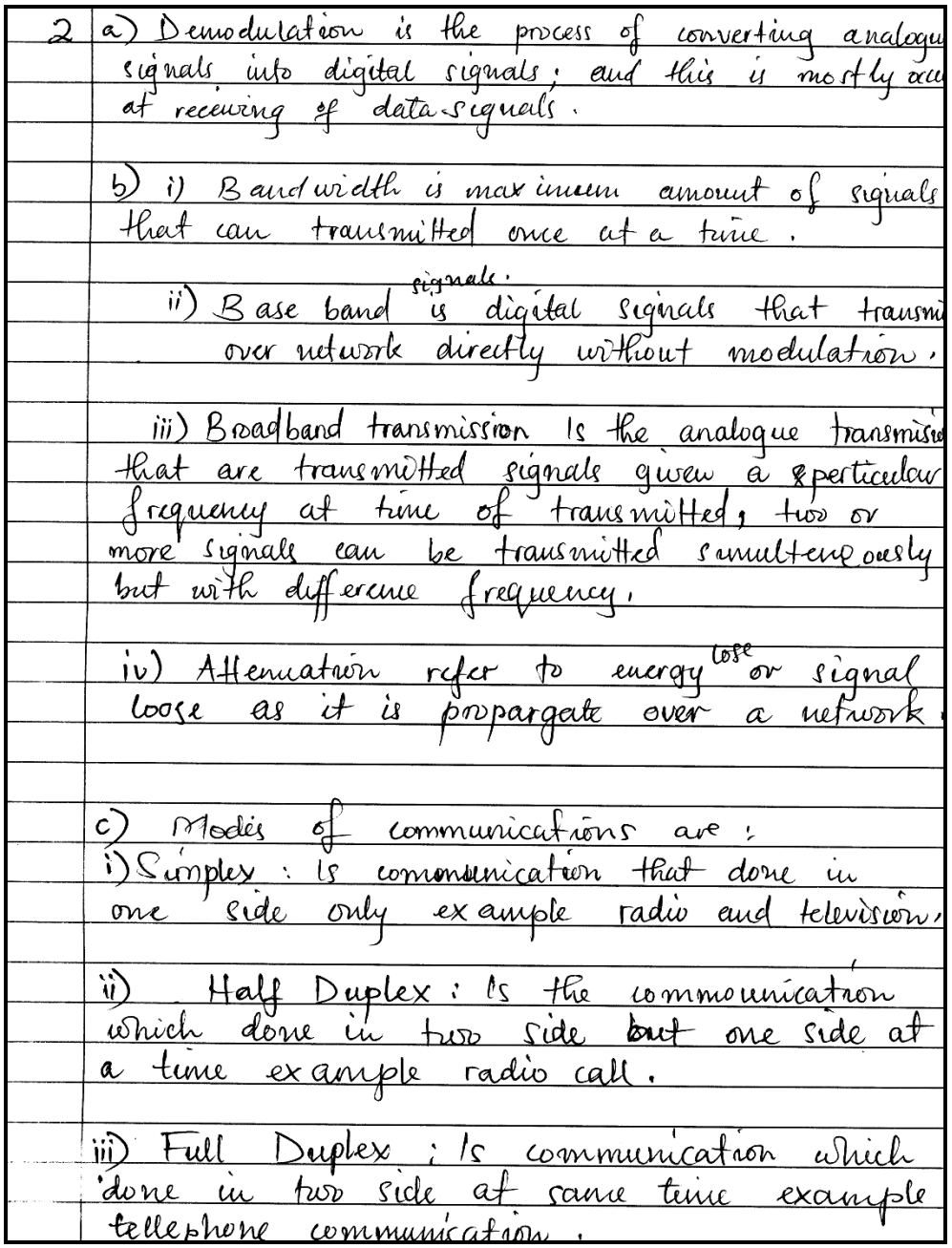


Extract 2.1: A sample of an incorrect response to question 2 in paper 1

In extract 2.1, the candidate failed to explain the demodulation process, bandwidth, baseband signal, broadband transmission and attenuation in part (a) and (b). In part (c), the candidates wrote ways of data transmission instead of modes of data communication.

On the other hand, the candidates (19.3%) who scored average marks (3.5 - 5.5) explained correctly only the meaning of demodulation process in part (a). However, some of them explained the term ‘Modem’ instead of demodulation process. These candidates failed to differentiate between the process of data transfer and the device required to transfer data. In part (b), some of the candidates managed to describe Bandwidth and Attenuation but failed to describe Baseband signal and Broadband transmission. Others interchanged the meaning of Baseband signal with Broadband transmission. In part (c), the candidates managed to describe only one or two modes of data communication and failed to explain others. Moreover, other candidates mentioned correctly all the three modes of data communication but failed to explain them.

The statistics show that, a few candidates (6.5%) scored high marks (6 - 10). The analysis of the responses shows that the candidates managed to describe the term demodulation process in part (a). In part (b), they explained correctly at least two terms as used in data communication. However, some of the candidates gave unclear explanations for the terms hence, they could not score all the marks in this part. In part (c), the candidates described correctly at least two modes of data communication. However, some of them failed to give examples. This led them to lose some marks. Extract 2.2 presents a sample of correct response.



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

In extract 2.2, the candidate managed to explain the demodulation process, bandwidth, baseband signal, broadband transmission, attenuation and the three modes of data communication clearly with examples.

2.1.3 Question 3: Data Representation

In this question the candidates were required to;

(a) differentiate analogue from digital quantities.

(b) convert decimal number 30_{10} to binary form and to find the following;

(i) 1's complement

(ii) 2's complement

(c) perform the following subtraction operation using 2's complement and to express the answer in decimal numbering system in;

(i) $100.5_{10} - 50.75_{10}$

(ii) $10_{10} - 28_{10}$

A total of 310 (100%) candidates attempted this question, out of whom 182 (58.7%) scored from 0 to 3 marks, 89 (28.7%) scored from 3.5 to 5.5 marks and 39 (12.6%) scored from 6 to 10 marks out of the 10 marks allocated. Figure 3 illustrates the candidates' performance on this question.

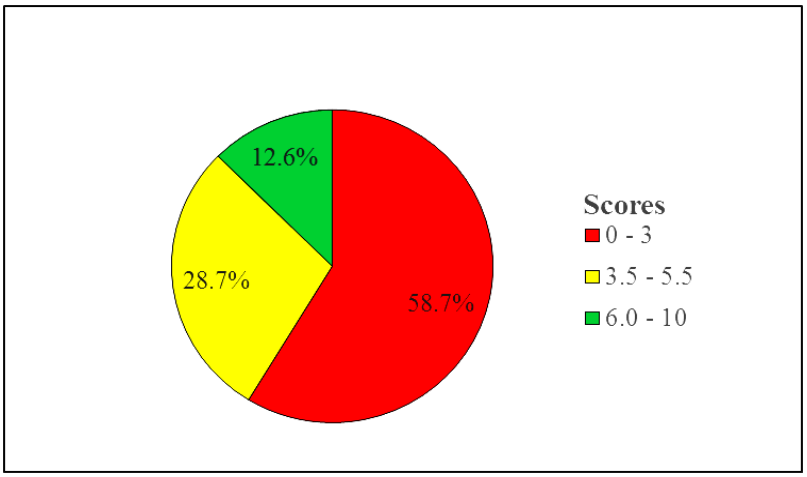


Figure 3: *The candidates' performance on question 3 of paper 1.*

The general performance on this question was average because 41.3 per cent of the candidates scored 3.0 marks or above. The analysis shows that, the candidates (58.7%) who scored low marks (0 - 3) failed to differentiate analogue from digital quantities in part (a). Some of the candidates explained them as ways of information dissemination instead of ways of representing data. For example, one candidate wrote; *Analogue quantities*

uses traditional or local ways like letters and drama while digital quantities have modern or technological ways like computer, radio and TV. Other candidates interchanged the explanations of analogue with digital quantities. In part (b), the candidates converted correctly decimal number 30_{10} to binary number but they failed to find its 1's and 2's complements. Some of the candidates followed the correct procedures of converting decimal to binary number but failed to arrange them correctly. For example, one candidate wrote 0111_2 instead of 1110_2. This indicates that the candidate lacked practice on number conversion. In part (c), most of the candidates performed subtraction without using 2's complement. The candidates failed to convert the given decimal number into binary number. This indicates that the candidates had insufficient knowledge of ways of representing data. Other candidates failed to perform the subtraction operation. This made them obtain incorrect decimal number. For example, one candidate wrote, 16_{10} instead of -18_{10} from $10_{10} - 28_{10}$. This shows that the candidate had insufficient knowledge of arithmetic calculation. Extract 3.1 presents a sample of such incorrect responses.

3 a) Differentiate between Analogue and digital quantities.

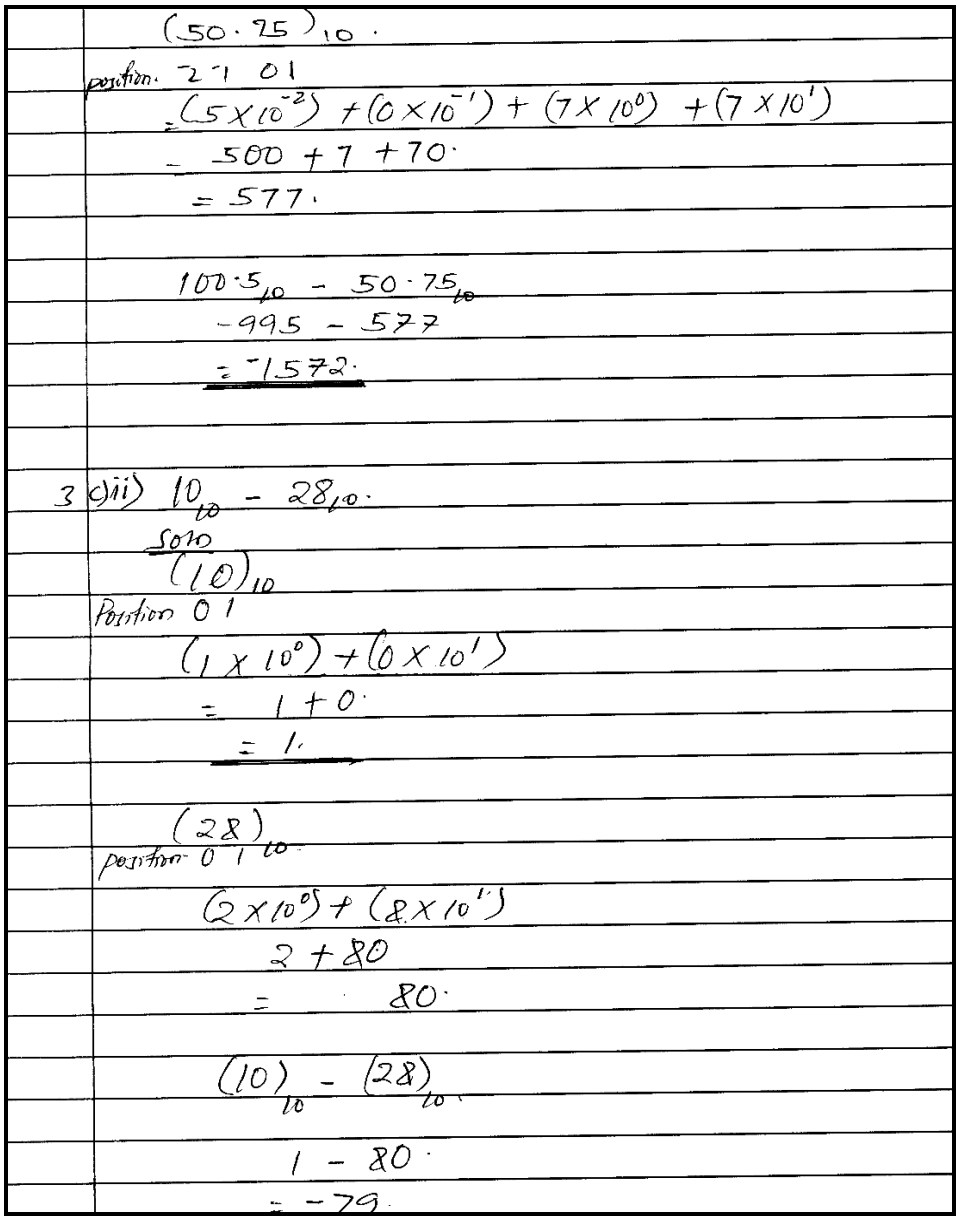
Analogue quantities refer to a quantity than use binary digits (both 1's 0 and 1. While digital quantities this are countinuously quantities.

3 b) Convert decimal number 30_{10} to binary.

Solu

by	Number	Remainder	
2	30		
2	15.	0	— Lowest significant bit.
2	7	1	
2	3	1.	
2	1	1	
	0	0	— Most significant bit.

$\therefore 30_{10} = (01110)_2$.



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

The response of the candidate in extract 3.1 shows that the candidate failed to differentiate analogue from digital quantities and failed to convert decimal to binary number system. The candidate also failed to find 1's and 2's complements of the binary number and failed to perform the subtraction operation using 2's complement as it was instructed.

Further analysis from the candidates' responses reveals that the candidates who had an average performance from 3.5 to 5.5 marks were able to differentiate analogue from digital quantities in part (a). Some of the candidates gave unclear explanation of the term analogue and digital quantities which led them to lose some marks. In part (b), the candidates performed correctly the conversion of decimal to binary number system and managed to find the 1's complements of the given binary number. However, they failed to find its 2's complement. In part (c), the candidates managed to convert the given decimal into binary number but they failed to use 2's complement to perform subtraction operation. Some of the candidates were able to convert the whole number part but failed to convert the decimal part. For example, one of the candidates wrote; $1100100.01_2–110010.10_2$ instead of $1100100.10_2–110010.11_2$. This shows that, the candidate lacked practice on conversion of numbers. Other candidates converted decimal to hexadecimal number instead of converting to binary number.

On the other hand, the candidates (12.6%) who scored marks ranging from 6 to 10 managed to differentiate analogue from digital quantities in part (a). In part (b), the candidates converted correctly the decimal number 30_{10} into binary number. They also managed to find the 1's complement and the 2's complement of the binary number. However, the candidates failed to perform the subtraction operation using 2's complement and expressing it into decimal numbering system in part (c). Some of the candidates performed the subtraction of minuend with the 2's complement of subtrahend instead of addition of minuend with the 2's complement of subtrahend which resulted in wrong binaries. This led them to lose some marks. Other candidates subtracted correctly the given decimal to binary number but they gave the solution in binary form instead of decimal form. Moreover, some of the candidates failed to convert the binary number obtained from 10_{10} - 28_{10} into negative decimal number. Others gave correct decimal number but they did not show all the required steps to get the number. This led them to lose some marks. Extract 3.2 presents a sample of correct responses.

3.

(a) Analogue quantities are the quantities whose signal operate in continuous form (like a sine wave) while Digital quantities are the quantities whose signal operate in discrete form (i.e 0 and 1).

(b)

i) 1's Complement.

30_{10}

2	30	
2	15	rem 0
2	7	rem 1
2	3	rem 1
2	1	rem 1
	0	rem 1

$30_{10} = 11110_2$

1's Complement $= 00001_2$ Or 1_2

∴ 1's Complement is 00001_2

Or 1_2

x) 2's Complement.

$30_{10} = 11110_2$

1st Complement of $30_{10} = 00001_2$

2's Complement = $00001 + 1$

$$\begin{array}{r} 00001 \\ +\quad\ 1 \\ \hline 10 \end{array}$$

∴ 2's Complement is 10_2

(c)

1) $100.5_{10} - 50.75_{10}$

For 100.5_{10}

$100 = 1100100_2$

$0.5 \times 2 = 1$

$0.5 = 1_2$

$100.5_{10} = 1100100.1_2$

For 50.75_{10}

$50 = 110010_2$

$0.75 \times 2 = 1.5$

$0.5 \times 2 = 1$

$0.75_{10} = 11_2$

$50.75_{10} = 110010.11_2$

$= 1100100.1_2 + (-(00110010.11_2))$

but $(-00110010.11_2) = 11001101.00_2$

For 2's Complement

$= 11001101.00_2 + 1.000000.01_2$

$= 11001101.01_2$

$= 1100100.1_2 + 11001101.01_2$

$= (1)01100001.11_2$

overflow bit.

$= 01100001.11_2$

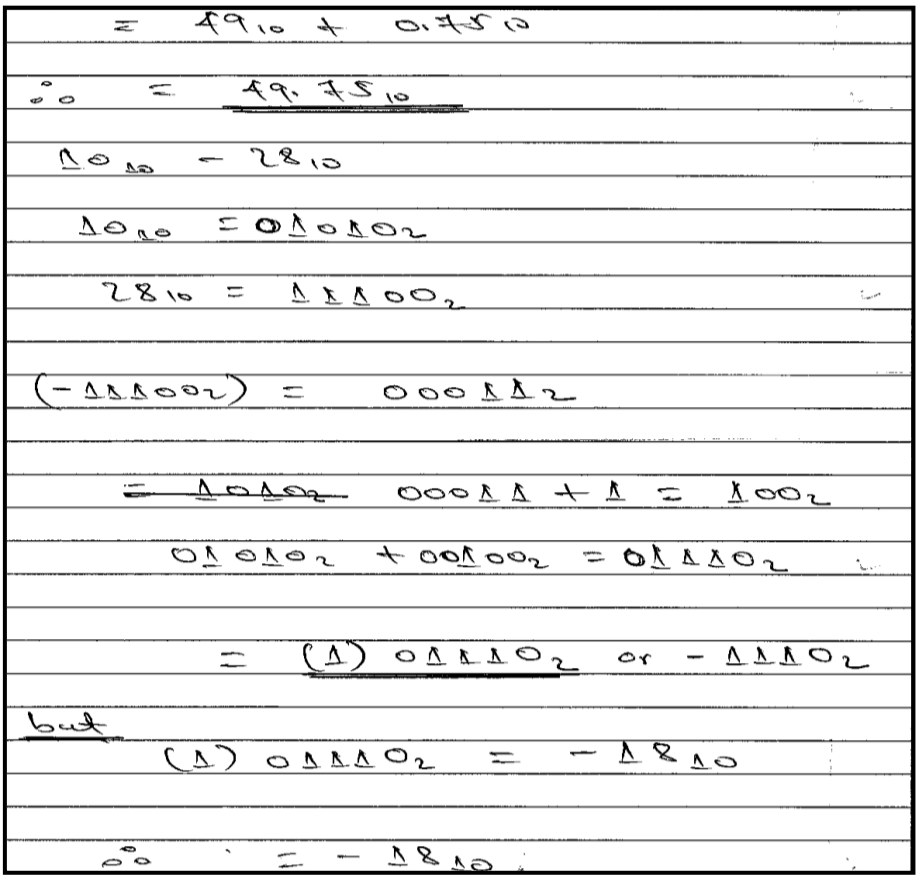
$0.11_2 = (1 \times 2^{-1}) + (1 \times 2^{-2})$

$= 0.5 + 0.25$

$= 0.75_{10}$

$01100001 = (1 \times 2^5) + (1 \times 2^4) + (0 \times 2^3) + (0 \times 2^2) + (0 \times 2^1) \times (1 \times 2^0)$

$= 49.75$



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

In extract 3.1, the candidate managed to differentiate analogue from digital quantities, covert the given decimal number to binary form and then managed to find the 1's and 2's complement of the given binary number. Also the candidate managed to perform addition of minuend using 2's complement of subtrahend.

2.1.4 Question 4: Visual Programming

In this question, the candidates were required to: -

(a) differentiate public subprocedure from private subprocedure as applied in Visual basic.
(b) explain what will happen if the number of items exceeds the value that can be displayed in the ComboBox?
(c) explain three types of ComboBox styles.

(d) read the given Visual Basic Codes and answer the question that follow:

```
Private Sub cmdRemoveListItem_click ()
If MyList.ListIndex>-1 Then
MyList.RemoveItem MyList.ListIndex
End if
```

(i) What will ListIndex property do if there is no item selected in the list?

(ii) Which type of event will cause the computer to execute the codes above?

A total of 310 (100%) candidates attempted this question, out of whom 305 (98.4%) scored from 0 to 3 marks, 3 (1%) scored from 3.5 to 5.5 marks and 2 (0.6%) scored from 6 to 10 marks out of the 10 marks allocated. The performance of the candidates is summarised in Table 1.

Table 1: Summary of the Candidates' Performance in Question 4

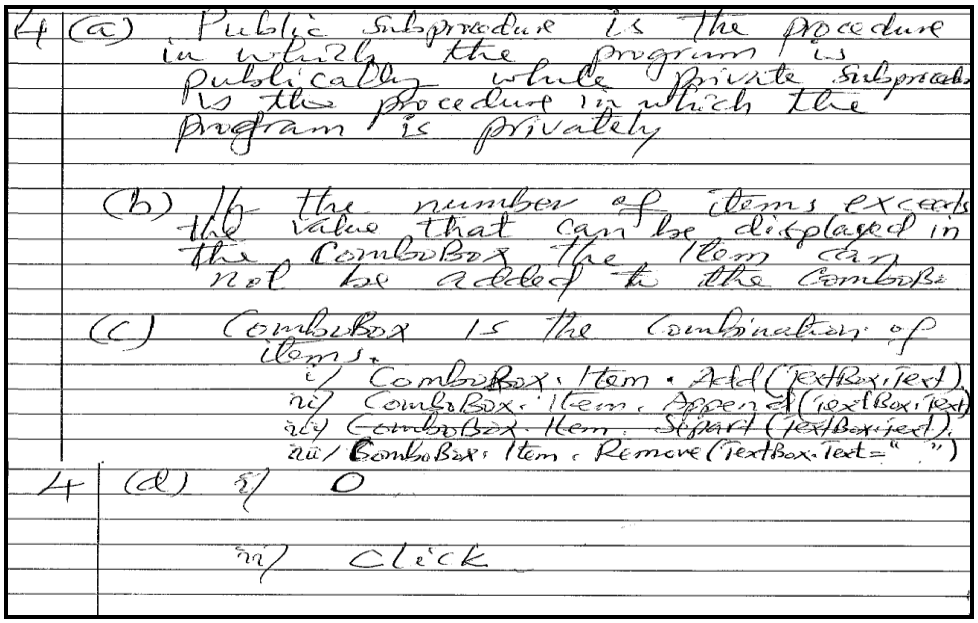
Scores	**Number of candidates**	**Per centage of candidates**
0 – 3	305	98.4
3.5 – 5.5	3	1
6.0 – 10	2	0.6
Total	**310**	**100**

The illustration above shows that the general performance was poor because 98.4 per cent of the candidates scored from 0 and 3 out of 10 marks allocated in this question.

The analysis from the candidates' responses showed that most of the candidates (98.4%) who scored low marks in this question gave direct interpretation of the term "public" and "private" in part (a). For example, one of the candidates wrote; *Public subprocedures -is the procedures which used by all organization and public institution e.g. School, but private subprocedures –is the subprocedures which used by private person or authorized owned by individual person.* In part (b), the candidates

failed to explain what will happen if the number of items exceeds the value that can be displayed in the ComboBox. Most of the candidates lacked practical skills, which led them to give irrelevant responses. For example, one of the candidates wrote; *The ComboBox will never display those items exceeded the value that can be displayed in the ComboBox.* This shows that, the candidate lacked practical skills on Visual programming. In part (c), some of the candidate listed other form features such as Check box, Option box and Search box instead of explaining the types of ComboBox styles. These candidates did not know that, the types of ComboBox styles includes *Dropdown (style 0)*, *Simple (style 1)*, *Dropdown-List (style 2)*.

Other candidates explained on irrelevant features such as rectangles, Oval shapes and Squares. The candidates failed to understand that, these shapes are mathematical features and not features used in a Visual Basic programming. Moreover, some candidates explained vertical and horizontal orientation of ComboBox instead of types of ComboBox styles. This indicates that, the candidates did not understand the requirements of the question. In part (d), the candidate failed to interpret the given Visual Basic codes. Hence, they were not able to provide a correct answer in part (d) (i) and (ii). Extract 4.1 presents a sample of such incorrect responses.


4 (a) Public Subprocedure is the procedure in which the program is Publically while Private Subprocedure is the procedure in which the program is privately

(b) If the number of items exceeds the value that can be displayed in the ComboBox the item can not be added to the ComboBox

(c) ComboBox is the combination of items.
i) ComboBox.Item.Add(TextBox.Text)
ii) ComboBox.Item.Append(TextBox.Text)
iii) ComboBox.Item.Start(TextBox.Text)
iv) ComboBox.Item.Remove(TextBox.Text="")

4 (d) i) 0

ii) Click

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

Extract 4.1 shows the response of the candidate who failed to differentiate public subprocedure from private subprocedure as applied in Visual Basic programming in part (a) and (b). However, the candidate was able to give the event required for the program to execute although failed to explain the three types of ComboBox styles in part (c) and (d).

Further analysis from the candidates' responses revealed that the candidates (1%) who had an average performance (3.5-5.5) managed to differentiate the term 'Public subprocedure' from 'Private subprocedure' in part (a). The candidates explained correctly the effect produced when the number of items exceeds the value within a ComboBox in part (b). In part (c), the candidates listed correctly the types of ComboBox styles but failed to explain them. This led them to lose some marks. Moreover, the candidates failed to interpret the conditional statement in part (d) (i) but they were able to give the correct event for the computer to execute the given Visual Basic codes in part (d) (ii).

On the other hand, two (0.6%) candidates who scored high marks managed to differentiate Public subprocedure from Private subprocedure correctly in part (a). The candidates explained correctly what will happen if the number of items exceeds the value that can be displayed in the ComboBox in part (b). However, one of the candidates managed to explain only one type of ComboBox and failed to explain the other two types in part (c). Another candidate listed correctly all three types of ComboBox styles with incomplete explanations. In part (d), the candidates managed to interpret the given Visual Basic codes hence, they stated correctly the effect of ListIndex if there is no item selected on a list and gave the correct event for the computer to execute the given Visual Basic codes.

2.1.5 Question 5: Data Structure and Algorithms

In this question, the candidates were required to:

(a) give the meaning of a pointer.
(b) state three advantages of a pointer.
(c) explain the advantage of dynamic data structure over static data structure in terms of size.

(d) distinguish between the following statements as used in the pointer:
int*ptr = new int (5); and int*ptr = new int [5];

A total of 310 (100%) candidates attempted this question, out of whom 282 (91%) scored from 0 to 3 marks, 20 (5.8%) scored 3.5 to 5.5 marks and 8 (3.2%) scored 6 to 10 marks out of the 10 marks allocated. The candidates who scored 0 marks were 71 (22%). Figure 3 illustrates the candidates' performance in this question.

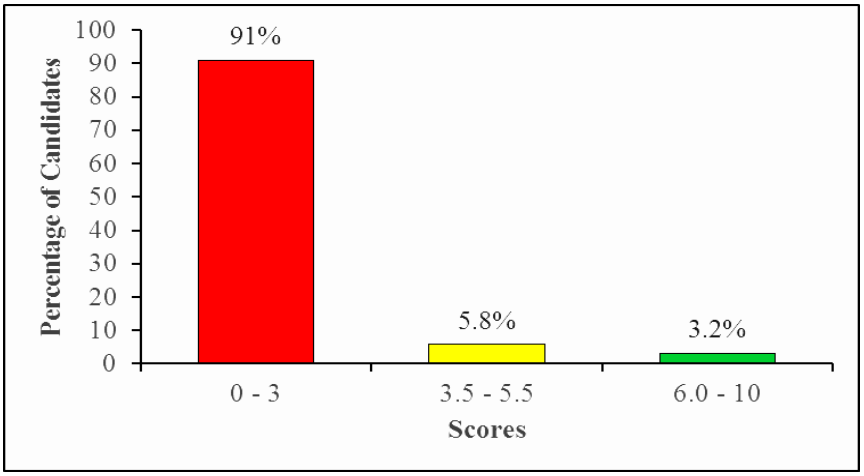
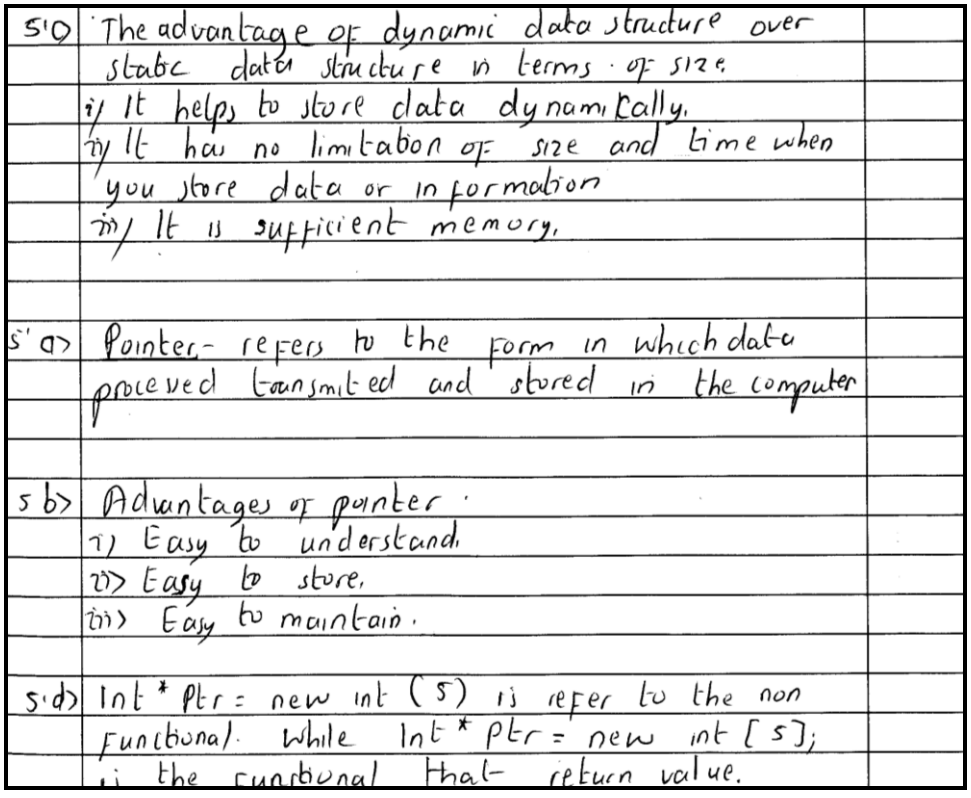


Figure 5: *The candidates' performance in question 5 of paper 1.*

The general performance in this question was poor because majority of the candidates (91 %) scored low marks (0 - 3).

The analysis shows that some of the candidates who scored low marks in part (a) incorrectly related the variable pointer with the pointer stick, normally used by the teacher during the teaching process. Other candidates related the term pointer with a cursor required to select and point files and folders on a computer. This shows that the candidates lacked knowledge of variable pointer used in programming. In part (b), most of the candidates wrote the advantages of pointer stick and cursor instead of variable pointer. For example, one of the candidates stated the advantages of cursor as pointing the device used to select folders and files in the computer. The candidates were not aware that a pointer is the memory used to store variables in a program. In part (c), some candidates managed to give the advantages of dynamic over static data structure but

failed to explain it in detail. Other candidates gave normal translation of the term dynamic and static which is not related to programming. For example, one of the candidates wrote; *dynamic data structure as data structure which changes at any time according to the environment and easy to spread at any place in the world*. Others defined the term dynamic data structure instead of giving its advantage in terms of size. This shows that the candidates lacked knowledge of dynamic and static data structure. In part(d), the candidates failed to distinguish between the statement int*ptr=new int (5); and int*ptr=new int [5]; as used in the pointer. Some of the candidates gave differences based on the format of the brackets given by a variable instead of the memory size of a variable. Extract 5.1 presents a sample of such incorrect responses.


5'c) The advantage of dynamic data structure over static data structure in terms of size.
i) It helps to store data dynamically.
ii) It has no limitation of size and time when you store data or information
iii) It is sufficient memory.

5'a) Pointer- refers to the form in which data proceved transmited and stored in the computer

5 b) Advantages of pointer.
i) Easy to understand.
ii) Easy to store.
iii) Easy to maintain.

5.d) Int * ptr = new int (5) is refer to the non functional. While Int * ptr = new int [5]; is the functional that return value.

Extract 5.1: A sample of an incorrect response to question 5 in paper 1

In extract 5.1, the candidate defined a pointer as a form instead of variable in part (a). In part (b), the candidate wrote the advantage of that form of data processing. In part (c), the candidate gave incorrect advantages of

dynamic over the static data structure. Furthermore, in part (d), the candidate failed to distinguish the two given statements as used in the pointer.

On the other hand, the candidates (5.8%) who had an average performance defined correctly the term 'pointer' as applied in computer programming in part (a). The candidates managed to write only one or two advantages of a pointer but failed to write all the three in part (b). In part (c), the candidates defined the terms instead of giving advantages of dynamic over static data structure in terms of size. Some of the candidates gave advantages of dynamic over static data structure without considering their size. This implies that the candidates did not understand the question. In part (d), most of the candidates failed to differentiate int*ptr=new int (5) and int*ptr=new int [5]. Some of the candidates explained correctly the application of one statement but failed to compare with another statement. Other candidates gave unclear differences between two statements which led them to lose marks. For example, one of the candidates wrote; *int*ptr=new int [5] –is an array while int*ptr=new int (5) is not an array*. The candidate failed to relate the given size from each variable pointer.

Further analysis from the candidates' responses shows that the candidates (3.2%) who scored high marks defined correctly the term 'pointer' in part (a) and stated correctly three advantages of pointer in part (b). Some of the candidates explained correctly two advantages with one incorrect advantage. Other candidates repeated the same advantages which led them to lose some marks. Moreover, some candidates defined the term 'pointer' instead of giving its advantages in programming. In part (c), the candidates managed to explain the advantages of dynamic over static data structure. In part (d), the candidates were able to distinguish int*ptr=new int (5); and int*ptr=new int [5]; as used in the pointer. However, some of the candidates explained correctly the uses of one statement but failed to explain the uses of another statement. Extract 5.2 presents a sample of such correct responses.

5 (a) A pointer is a variable that is used to store the memory location (address) as its value. A pointer holds the address (memmory address) of a variable which it is attached or connected or assigned to.

(b) Advantages of pointers;

- They can be used to modify values stored in particular memory locations
- They are used in traversing of various sequential datastructures such as arrays and linked lists.
- They are used for local system tasks such as memory management where various computer tasks and variables can be

5 (c) The size of dynamic datastructures can change at runtime to accomodate the addition of new items whereas the size of a static datastructure remains fixed and cannot change at runtime to accommodate the addition of new items.

(d)

```
int *ptr = new int(5)      -- statement 1

int *ptr = new int[5]      -- statement 2.
```

Statement 1 creates an object pointer whose value is 5 when statement 2 does not create a pointer object.

Extract 5.2: A sample of a relatively good answer to question 5 of paper 1

In extract 5.2, the candidate managed to define a variable pointer, stated correctly the three advantages of the variable pointer and explained clearly the advantages of dynamic data structure over the static data structure. However, the candidate failed to distinguish the statement int*ptr = new int (5); and int*ptr = new int [5]; as used in a pointer.

2.1.6 Question 6: Website Development

In this question, the candidates were required to; (a) explain briefly three HTML tags which are used together with <table> tag when creating tables, (b) write HTML codes which display the given table, (c) explain three ways used to embed JavaScript into HTML with examples.

A total of 310 (100%) candidates attempted this question. Out of whom 175 (56.5%) scored from 0 to 3 marks, 117 (37.7%) scored 3.5 to 5.5 marks and 18 (5.8%) scored 6 to 10 marks out of the 10 marks allocated. Figure 6 illustrates the candidates' performance on this question.

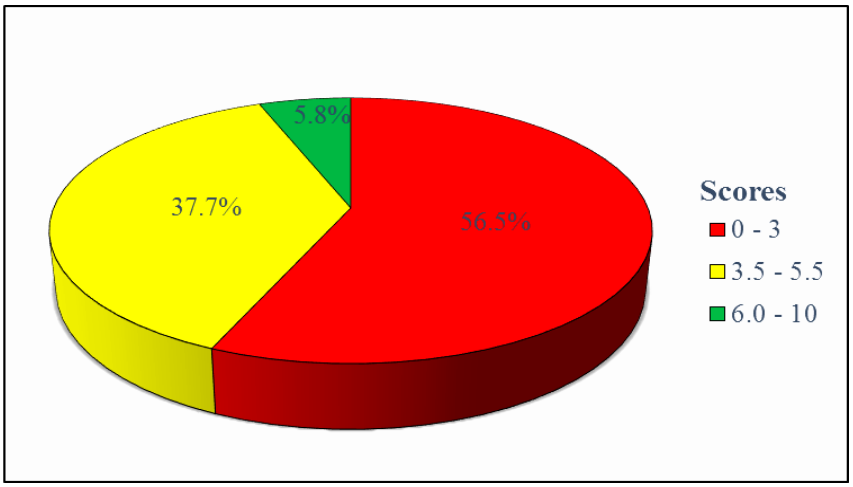


Figure 6: *The candidates' performance in question 6 of paper 1*

The general performance in this question was average because 43.5% of the candidates scored above 3 marks. The analysis shows that some of the candidates who scored low marks explained correctly the three basic tags used in creating tables in HTML in part (a). Other candidates managed to

explain correctly only two basic tags used together with <table > tag in creating a table. Moreover, some of the candidates mentioned correctly two out of three basic HTML tags and failed to explain them. This led the candidates to score low marks. In part (b), the candidates managed to write open and close HTML codes but failed to write codes to display a table. Some of the candidates used codes of designing a frame to create table. For example, one of the candidates wrote; *<Frame> row "3" column "3" </frame>*, instead of <table border = "1"> to create a table by using HTML codes. Other candidates failed to differentiate between the heading size codes and codes to design a column head in a table. For example, one of the candidates wrote; *<h1> Name </h1>* instead of <th> Name </th>. This indicates that the candidate had insufficient knowledge of table designing by using HTML codes.

In part (c), most of the candidates were not aware of how JavaScript can be embedded on the HTML page. Some of the candidates explained heading size h1, h2 and h3 as the ways to embed JavaScript into HTML page instead of <head> tag. This signifies that the candidates failed to differentiate the effect of heading size tag and <head> tag in HTML. Other candidates managed to list two out of three ways but failed to explain them and give their examples which led them to score low marks. In addition to that some candidates explained linking HTML pages as one of the ways to embed JavaScript using <a> tag. The candidates did not know that JavaScript statement can be a separate file that is attached to the HTML document. Extract 6.1 presents a sample of such incorrect responses.

6	(a) (i) <Head> This is tags used in creating
	table and to display head of table.
	(ii) <tr> This is another way used to.
	create a table as a table row
	and ~~tobe~~ desplay rows of tables
	(iii) <Label> this another code used as
	creating table,
6	b)
	<HTML>
	<Head> Student's information </head>.
	</th> <Table> bg- colour " grey </th>
	<label> <th> Name </ tath> </label>
	<Label> <tah> Registration </th> < label>.
	<tr> Changeme panda </tr>
	<tr> T. 2006. 27 </tr> </br>
	<tr> ~~maputa pembe~~ Female </tr> </br>
	<label> <tr> maputa pembe </tr> </br>
	<tr> T. 2006. 217 </tr> </br>
	<tr> Male </tr> </br> </label>
	</Table>
	</html>
6	c) (i) By using htm code.
	This is the method used
	to embed javascript in Html page.
	(ii) By creating games.
	another way of embed.
	javas into different materials assumed.

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

In extract 6.1, the candidate managed to explain correctly one HTML tag out of three tags required to create a webpage in part (a). In part (b), the candidate wrote incorrect HTML codes to display the given table. Furthermore, in part (c), the candidate wrote incorrect ways used to embed JavaScript in the HTML page.

On the other hand, the candidate (37.7%) who scored average marks (3.5 - 5.5) managed to mention and explain correctly the three basic HTML tags used together with <table> tag when creating tables in part (a). In part (b), some of the candidates managed to write codes to open the HTML page but failed to indicate the table border. Others indicated the table border but failed to insert the colour in the header part of the table. Moreover, some of the candidates used the table data tag <td> instead of the table header tag <th> in a header part of the table. This shows that the candidate had insufficient knowledge of table designing by using HTML codes. Other candidates interchanged the position of <tr> and <td> in a table designing. The candidates wrote, *<td> <tr> changeme Panda</tr> <tr> T.2006.27 </tr> </td>* instead of <tr> <td> changeme Panda</td> <td> T.2006.27 </td> </tr>. The candidates were supposed to know that the row should be designed before the column in HTML table. In part (c), some candidates managed to mention and explain one way out of three ways used to embed the JavaScript into HTML page and they could not provide examples as per the question's requirements. Other candidates mentioned head part and external part of the scripts but they failed to provide correct explanations and examples, thus some marks were lost.

Further analysis shows that the candidates (5.8%) who scored high marks (6 – 10) were able to provide correct responses to most parts of the question. The candidates explained the three basic HTML tags used together with <table> tag in creating table in part (a). They also wrote correctly the HTML codes required to display the given table in part (b). A few candidates managed to write correct codes to display the HTML table but failed to write the codes required to display the header colour of the table. Moreover, in part (c), some of the candidates managed to explain correctly without giving examples of the three ways used to embed the JavaScript in the HTML page. Other candidates mentioned two ways out of the three ways used to embed JavaScript in the HTML page

without giving examples hence; they failed to score all marks allocated to this question. Extract 6.2 presents a sample of such correct responses.

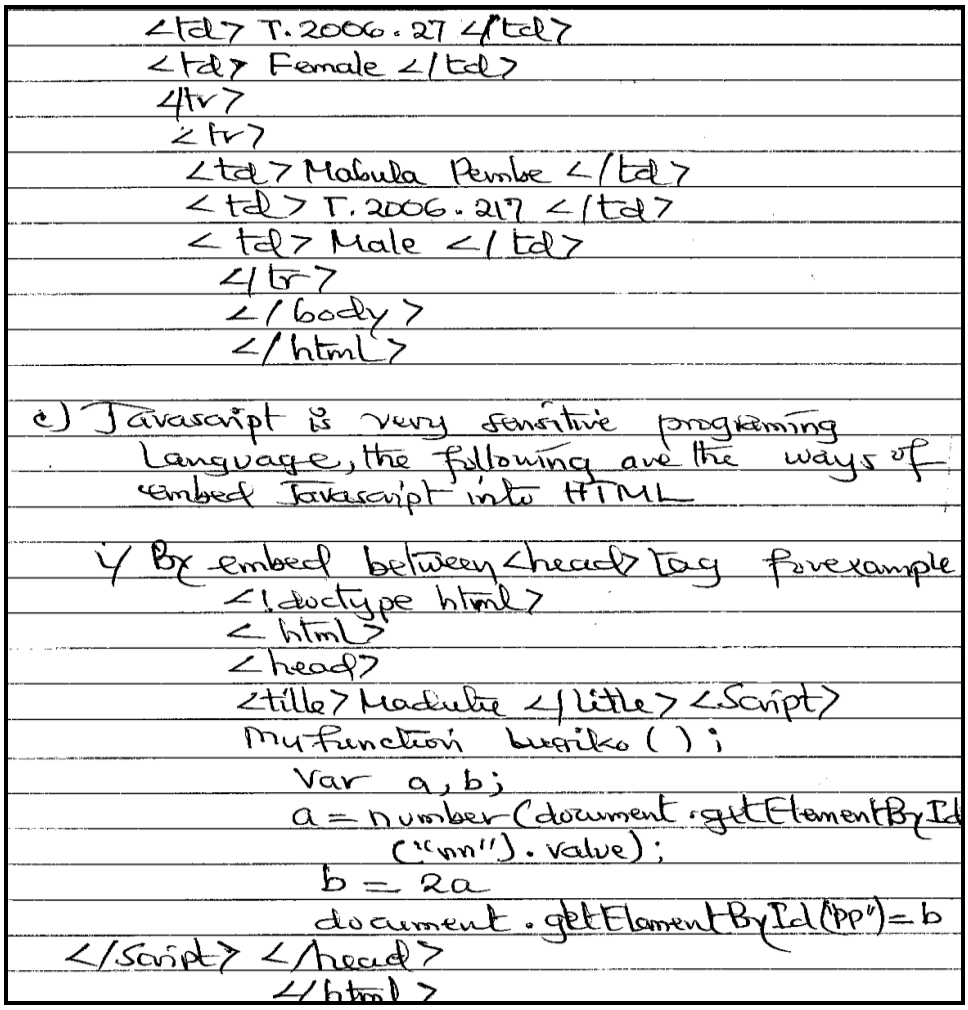
6 a) There are three basic HTML tagss which are used together which are

i) Table row <tr></tr>.
- It mainly to ~~create~~ construct rows of the table in HTML

ii) Table head <th></th>
- It is mainly to construct or to show and to bold the words in the head of the tables in HTML

iii) Table data <td></td>
- It is mainly to construct or to fill data in the table in HTML

b)
```
<!doctype html>
<html>
<head>
<title> module </title>
</head>
<body>
<table>
<Caption> Students' Information </Caption>
<table border="2">
<tr style="background color: grey">
<th> Nome </th>
<th> Registration' </th>
<th> Sex </th>
</th></tr>
<tr>
<td> changeme Panda </td>
```



Extract 6.2: A sample of a relatively good answer to question 6 of paper 1.

In extract 6.2, the candidate managed to explain correctly the three tags used to create tables in part (a). In part (b), the candidate managed to write correctly HTML codes to display the given table, while in part (c), the candidate explained correctly only one way out of the three ways used to embed the JavaScript in the HTML page.

2.1.7 Question 7: C++ Programming

In this question the candidates were required to; (a) differentiate relational operator from logical operator as applied in C++ programming language with an example in each case, (b) describe a *while loop* and *do…while* loop with the aid of syntax template (or general form), (c) explain when the *while* and *do…while* loops are generally used and (d) identify the output of the following program;

```
#include<iostream>
Using namespace std;
int main()
{
int i=3,j;
while(i)
{
        cout<<"i= "<<i<<'';
        for (j=0; j<i; j++)
        cout<<"j="<<j<<'';
        cout<<'\n';
        i--;
}
        system("pause");
        return 0;
        }
```

A total of 310 (100%) candidates attempted this question. Out of whom 284 (91.6%) scored from 0 to 3 marks, 17 (5.5%) scored 3.5 to 5.5 marks and 9 (2.9%) scored 6 to 10 out of the 10 marks allocated. The candidates' general performance in this question was poor because 93.2 per cent of the candidates scored below 3.5 marks. Figure 7 illustrates the candidates' performance in this question.

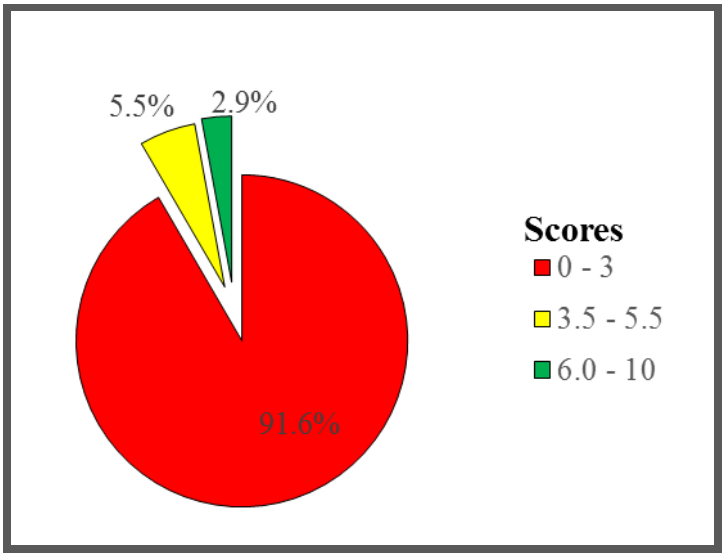
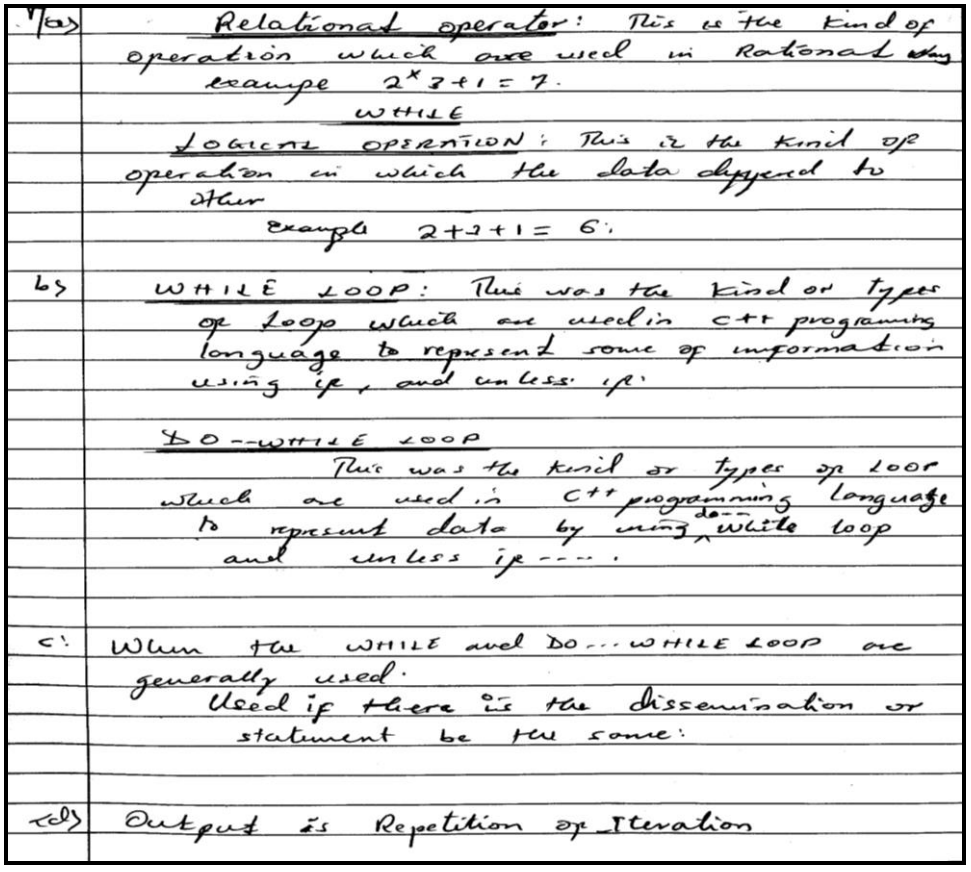


Figure 7: *The candidates' performance in question 7 of paper 1.*

The candidates who scored low marks, that is, 0 to 3 marks managed to give examples of relational operator and logical operator as applied in the C++ programming language but failed to explain them. Some of the candidates explained correctly only the relational operator with examples but failed to explain the logical operator. Others interchanged the definitions of relational operator and the logical operator. Moreover, some of the candidates mentioned examples of arithmetic operations instead of examples of relational and logical operators. This shows that the candidate lacked knowledge of the C++ programming language. However, a few candidates gave correct explanations with the correct examples. In part (b), some candidates interchanged the definition of *while loop* and *do…while loop*. Other candidates gave direct translation of the terms w*hile* and *do…while* without regarding them as loops used in the C++ programming language. For example, one candidate wrote; *while loop is one which place against the something else, do...while loop is the fake place on behalf of something else*. Furthermore, one candidate drew an arrow (⟶) to express *while loop* and arrow pointing in two directions (⟷) to express *do… while* loop. This indicates that the candidate failed to express the concept of loops in words.

In part (c), some of the candidates explained how the loops work instead of when they are used. Other candidates gave the application of *while* and *do…while* which are not related to the with C++ programming language. For example, one candidate wrote; *do...while loops are generally used in banking where you can navigate*. This indicates that the candidate did not understand the question requirement. In part (d), some of the candidates drew Pascal's triangle as the output of the given code. This indicates that, the candidate guessed the output without considering the given the C++ program. Some candidates copied the question while others listed the numbers in ascending and descending orders without relating the given lines of codes. For example, one candidate wrote; *i=3,2,1* and j=0,1,2,3,4,5. This signifies that the candidates lacked knowledge of the C++ programming language. Extract 7.1 presents a sample of such incorrect responses.


(a) Relational operator: This is the kind of operation which are used in Rational eg example $2^{*}3+1=7$.
WHILE
LOGICAL OPERATION: This is the kind of operation in which the data dipperent to other
example $2+3+1=6$.

(b) WHILE LOOP: This was the kind or types of loop which are used in c++ programing language to represent some of information using if, and unless if.

DO--WHILE LOOP
This was the kind or types of LOOP which are used in C++ programming language to represent data by using do-- while loop and unless if ----.

(c) When the WHILE and DO ... WHILE LOOP are generally used.
Used if there is the dissemination or statement be the some:

(d) Output is Repetition or Iteration

Extract 7.1: A sample of an incorrect answer to question 7 of paper 1

In extract 7.1, the candidate failed to differentiate relational and logical operator and gave a wrong example to each operator in part (a). The candidate gave incorrect description of *while* and *do…while* loop and failed to state when the two loops are used in C++ program in part (b) and (c). Also, the candidate failed to give the required output of a C++ program in part (d).

Moreover, the candidates (5.5%) who scored average marks (3.5 - 5.5) gave correct differences of relational and logical operators but failed to give correct examples. Some candidates managed to give correct explanations of one operator and correct examples but failed to explain another operator. This indicates that the candidate had insufficient knowledge of relational and logical operator as applied on C++ programming. In part (b), some candidates managed to write the correct explanation of *while loop* with its syntax but failed to explain the *do…while loop* and its syntax. Other candidates managed to give the syntax of *while loop* and *do while loop* but failed to describe them. In part (c), some candidates interchanged the uses of the two loops in a program hence lost some marks. In part (d), the candidates were able to write one line as an output of the given program but failed to give the other two lines which led them to lose some marks as well.

On the other hand, the candidates (2.9%) who scored high marks differentiated correctly the relational operator from the logical operator in part (a). Some candidates managed to explain only the relational operator with examples but failed to explain the logical operator as applied in C++ programming. Others gave correct explanations of both operators but failed to give examples of the logical operators. In part (b), most candidates were able to describe a *while* and *do…while* loop. However, some of them failed to write the syntax template. Other candidates managed to write the syntax template of one loop but failed to give the template of another loop. Furthermore, in part (c), most candidates gave the correct response but, a few of them gave the use of the loops instead of stating when the loops are generally used which made the candidates not able to score all the marks in this part. In part (d), the candidates gave the correct output of the C++ program. Extract 7.2 presents a sample of such correct responses.

7. (a) Relational operator is an operator found on C++ programming which shows the relationship between two conditions example of two Relational operator are (&&)-called And operator and (||) while Logical Operator when applied in C++ programming language is checks the condition of the statement ~~examples~~ whether it is true or false examples of logical operators are (==), (!=), (>=), (<=).

7. (b)

The while-! loop → is a ~~control~~ repetitive control data found on C++ programming /other programming in which the conditions starts first then the statements follows.

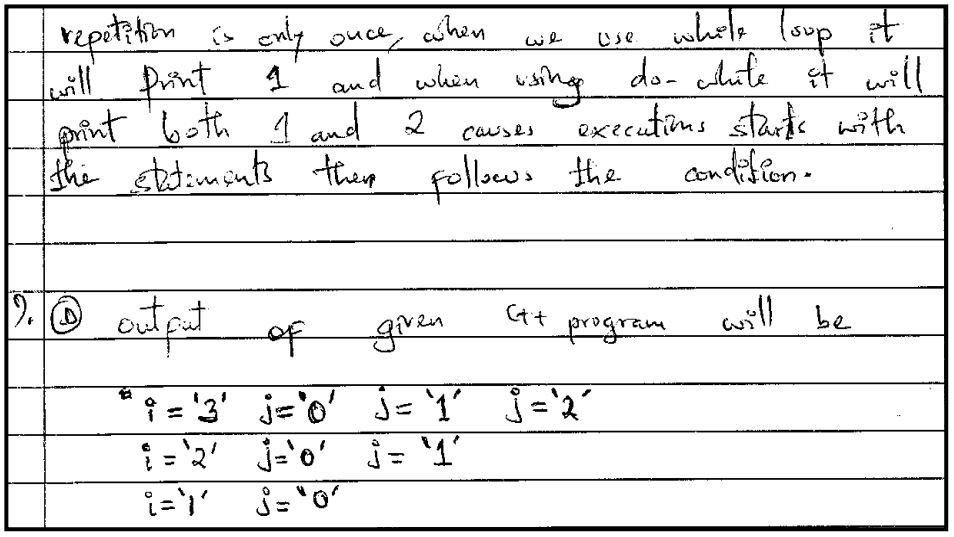
Its syntax is

```
while (condition)
{
//
// statements
//
}
```

do ... while → is a repetitive control data found on C++ programming in which the executions of statements begins then follows the condition.

Its syntax is

```
do
{
//- - -
//- - - statements
//
}
```



Extract 7.2: A sample of a relatively good answer to question 7 of paper 1

In extract 7.2, the candidate managed to describe the *while* and *do…while* loop with an example in each case. Also, the candidate explained correctly when *while* and *do…while* loops are generally used and gave correct output from the C++ programming syntax. However, the candidate failed to explain the logical operator as applied in C++ programming. Furthermore, the candidate interchanged the examples between relational and logical operators.

2.1.8 Question 8: IT and Environment

This was an essay question and the candidate was required to explain six ways in which ICT may affect human health, culture and environment.

The statistics show that 259 (83.5%) candidates attempted this question, of which 131 (50.6%) scored from 0 to 5 marks, 90 (34.7%) scored 5.5 to 8.5 marks and 38 (14.7%) scored 9 to 15 out of the 15 marks allocated. Figure 8 summarises the candidates' performance in this question.

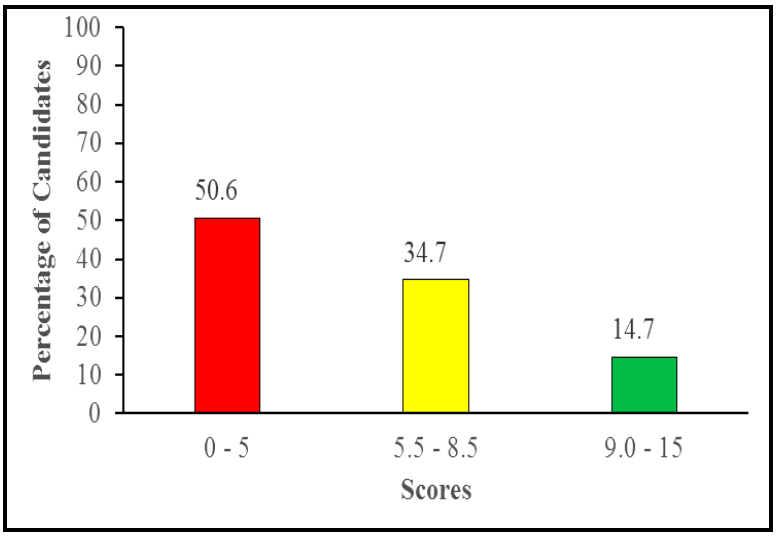


Figure 8: *The candidates' performance in question 8 of paper 1.*

The general performance of the question was poor because 66.4 per cent of the candidates scored below 6 marks.

The analysis shows that the candidates (50.6%) who scored low marks managed to explain only one or two ways in which ICT may affect human health, culture or environment. The candidates failed to give correct introduction and conclusion. Some of the candidates defined or gave the long form of ICT instead of explaining the term ICT. This led them to lose some marks in the introduction. In addition to that, some of these candidates wrote positive impacts instead of negative impacts of ICT in human health, culture and environment. For example, one candidate wrote; *ICT led to development of our own environment*. This implies that the candidate did not understand the requirements of the question. Other candidates explained the disadvantages of using computer without focusing on how it affects human health, culture and environment. For example, one candidate explained online theft which is not the effect of ICT on health, culture and environment. Furthermore, some candidates gave correct answers but failed to explain them clearly due to poor English language proficiency. Extract 8.1 presents a sample of such incorrect responses.

8 To make the disease that can affect human health examples of duees that can use science and technology to make ~~Years of~~ CORONA virus

Should be create law, to control the young ~~Chattle~~ Children; These are ways that can affect the culture especially African country should be Create active law to contral children on how to use ~~See~~ information communication technology, mostly Children in African are death morel days when to use science and technology

Should be improved the science technology especially network These are ways on how to affect the environment should be improved science and technology that can be used in different sector example agriculture sector mining sector transport and communication syste

Therefore the following are ways of ICT may affec human health, culture and environment should be provide education, should be improved science and technology, should be contral diseases that Should be create electronic machines

Extract 8.1: A sample of an incorrect response on question 8 of paper 1.

In extract 8.1, the candidate gave incorrect introduction and conclusion. Also, the candidate failed to give the correct ways in which ICT can affect human health, culture and environment.

Most of the candidates (34.7%) who scored average marks were able to give the correct meaning of ICT and managed to explain some of the effects of ICT on human health and culture but failed to explain how it affects the environment. Furthermore, some of the candidates gave correct introduction and conclusion with two ways that ICT affects human health, but failed to give other correct ways on how ICT affects culture and environment. Other candidates gave correctly four ways by which ICT affects human health and culture. However, the candidates failed to give correct introduction and conclusion as well as the ways that ICT affects environment. This shows that

the candidate had inadequate knowledge of ICT especially on the environment. Further analysis shows that some candidates wrote the introduction based on the definition of computer only. This led them to lose some marks in the introduction. It is noted that some candidates mixed positive and negative effect of ICT in health, culture and environment while others gave six ways by which ICT affects only human health without explaining other ways in which ICT affects culture and environment.

On the other hands, the candidates (14.7%) who scored high marks (9.5 – 15) gave correct introduction, explained correctly the six ways in which ICT affects human health, culture and environment as well as the correct conclusion. This implies that the candidates had adequate knowledge of the ways in which ICT affects human health, culture and environment. However, some candidates were able to give the correct introduction of ICT and correct explanation on the ways that it may affect human health and culture but failed to explain the ways in which ICT affects the environment. Other candidates managed to explain six ways in which ICT affects human health, culture and environment but failed to give the correct introduction and conclusion. In addition to that, some of the candidates repeated to explain the same ways. Others gave correct introduction and effects of ICT but failed to write a plausible conclusion. This led them to lose some marks. Extract 8.2 presents a sample of correct responses.

8 ICT is the use of technology in different aspect in our daily activity that are being conducted. In now days the use of ICT is ~~,~~ commonly due to it's great impact to the society

The following are ways in which ICT affect human health

Repetative strain injuries, the use of computer for doing the same work or activity like typing for long time it cause wrist strain injuries for doing the same process more often for time, also the back bone strain for sitting on the chair for long time

Eyes strain and headache, sitting for long time to watch the screen of the computer, the light emitted from the screen cause the deffect to the eyes like shortsightdness and big longsightdness or blind .and also it cause to have headache from excessive light of the monitor

Effect on culture

Accessing dirty ~~sigh~~ site; ICT has brought internet technology which enable you to access different material from the websites, so that people especially the under age children are accessing the dirty sites like porn site which make them affect their moral culture and also meet the peer adult on that chat internet chart room which encourage them to bad unsafe sexual behaviour, this affect the cultural

8 value to the socity

Lead to drug trafficking and terrorism

ICT has various various means of communication to human, some people use the internet technology to make the virtual meeting to the dark web and planning for terrorism and drugs business these drugs and terrorism cause the cultural value for people is to engage in this matter due to ICT

Effect on environment

Electromagnetic emmission, the environment have been effect by ICT due to some machinery technologies emitt harmful radiation like Ultraviolent radiation which are harmful to human

Disposal of acidic material, the environment are affected by the disposal of acidic matrial like lead batteries which when stay for long time it draw acid which are harmful to human skin it can irritate and may cause career

ICT has brought great advantage since it simplify work like communication for the development of internet it also simlify work in the organization and industries

Extract 8.2 A sample of a relatively good answer to question 8 of paper 1

In extract 8.2, the candidate managed to explain six ways in which ICT may affect human health, culture and environment. However, the candidate wrote the incorrect introduction and conclusion.

2.1.9 Question 9: Information System

The question required the candidates to analyse four advantages and two disadvantages a school would get from using Database Management System (DBMS).

The statistics show that, 247 (79.7%) of the candidates attempted this question, of whom 31 (26.7%) scored from 0 to 5 marks, 50 (38.5%) scored 5.5 to 8.5 marks and 166 (34.8%) scored 9 to 15 out of the 15 marks allocated. Figure 9 summarises the candidates' performance in this question.

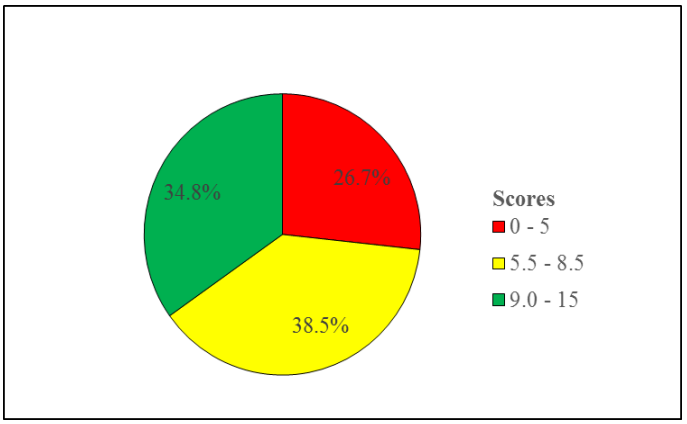


Figure 9: *The candidate" performance on question 9 of paper 1*.

The general performance on this question was good as 67.2 per cent of the candidates scored above 5.5 marks. The analysis of the candidates' responses in this question shows that the candidates (34.8%) who scored high marks explained correctly the advantages and disadvantages of using the database management system in schools. However, some candidates failed to give the introduction and the conclusion which led them to lose some marks. Moreover, some candidates gave correct introduction, advantages and disadvantages of the DBMS in schools but failed to provide correct conclusion. It was also observed that other candidates wrote incorrect disadvantages of using DBMS in schools. Extract 9.1 presents a sample of such correct responses.

9	Database Management System, is a system that uses the idea of arranging various data into tables so as to simplify acces to data. Database Management System has various advantages and Disadvantages to various organisation for example Schools. The following are the advantages of Database Management System as explained below. Easy acces to data, one of the advantages of the database management system is easy acces to data. For example the one operating this system can easily acces the details of a student who finished the school easily simply by searching his or her name in the system. This is among the advantages of the Database Management System to a school as explained. Protection of Data, by the use of Database management System, Data is easily protected as it is put is a well organised manner and only qualified personell and allowed personell can acces the database. For example: Data is protected in schools for example Students details about his or her parents, their phone numbers, the school of which the student is from. can't be easily accesed without the allowed personell and it in this case the allowed personell might be the headmaster or the Secretary who puts in this data.

9. Reduction of data redudancy, by the use database management system there is reduction of data redudancy. This means that with the use of database management system data can be easily well arranged in an ordered manner so as to enable easy acces in the future. For example data about workers in a schools can be easily arranged in the database management system so as to simplify easy ~~putting in~~ putting in of information and easily getting of the information for later use. This is among the advantage of database management system.

Data intergrity, by the use of database management system the information that is provided by the database is mostly accurate and well organised meaning that the information # can be used to perform other tasks. Also the data produced is for a specific entity. For example if one asks for phone numbers of the ~~stu~~ parents of the students in the ~~st~~ schools. The data can easily be acquired from the data base and can easily be presented to the specified person. This is among the advantages of Database management system.

In the other hand, Database Management system has various of the disadvantages to a school.

The following are the disadvantages of the Database Management system as explained below

9. Only skilled people with knowledge about Database management system can easily control the system, This means that if no one has the knowledge of using the system it can not be easily used. For example if the employee responsible for running this system is sick and there is no one with such knowledge this means that the Database management system will not be used. The Database management System only requires skilled people.

Expensive to establish and maintain, So as to establish this system in an organisation one must have money as this system uses Computers with a very high performances to ensure easy flow of data. These ~~expens~~ high performance computer are very expensive. Also maintainance costs for example using of Anti viruses so as to ensure protection against Viruses and malware requires alot of money to buy those softwares for example of Antiviruses that are bought and used anually are Kaspersky Antivirus.

In conclusion, Database Management System is a good system to use in any organisation as it simplifies easy access of data and enables protection of data. Database management system has enabled even the Nation of Tanzania to easily register all adult ~~system~~ citizens by the help of biometrics meaning the use of fingerprints to register your information in the dabase.

Extract 9.1: A sample of a correct answer to question 9 of paper 1.

In extract 9.1, the candidate gave the correct introduction, described advantages and disadvantages of the database management systems as used in schools and concluded correctly.

Most of the candidates (38.5%) who had the average performance managed to explain at least one advantage and one disadvantage of using database management systems in schools with plausible introduction and conclusion. The analysis shows that there were also candidates who interchanged the advantages and disadvantages of using database management system in schools. Other candidates gave advantages and disadvantages of database instead of DBMS. However, some of the candidates gave correct advantages and disadvantages of DBMS although they wrote the introduction based on database only without the conclusion. Other candidates wrote introduction of database instead of DBMS. For example, one of the candidates wrote; *DBMS is the method of collecting and organizing data for quickly retrieval.* The candidate did not realize that DBMS is a software and not a method of collecting and organizing data like a database. Furthermore, there were candidates who gave all advantages and disadvantages but failed to explain them in detail. This led them to lose some marks.

On the other hand, the candidates (26.7%) who scored low marks had inadequate knowledge about database management system. Some of the candidates outlined the functions of the operating systems instead of the database management system. For example, one of the candidates wrote *database management system is used to control computer resources*. Other candidates wrote advantages of DBMS but they did not focus on schools. Moreover, some of the candidates gave the advantages of search engine instead of school database. The candidates could not realize that, not all DBMS are used to search material like google. Others are used to record and store data like a school DBMS. A few candidates mentioned correctly some advantages and disadvantages but they provided wrong explanations. Most of the candidates who scored low marks gave irrelevant explanations of DBMS on schools. For example, one of the candidates wrote; *DBMS affect the school budget*. This signifies that the candidate lacked the knowledge of DBMS. Extract 9.2 presents a sample of such incorrect responses.

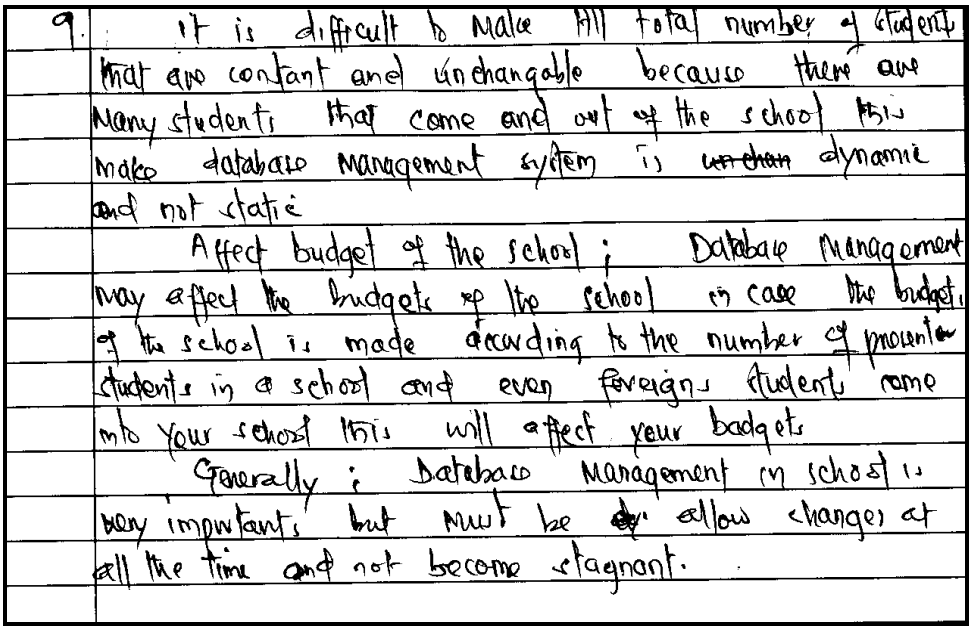
9 Database management system; Refer to the system software that allow user to keep data in an ordered form, or manner database management system are used in different fields like manufacturing, sales, bank, Management and in industries, the following are the advantages of database in school;

Prepare the students Database and record; database management system are used in school, for preparing student, record and their database in general so database management in school can also facilitate the presence of document of student from the beginning of the course to the end of the course

Help in the Management of school like supervision of teacher and availability of Teaching and learning resource; database management system in school can emphasize or influence the kind of material to be provided in case of quantities in order to fit the number of user example text book availability and other supplement any material like chalk.

Help to budget school budgeting; Database Management system if exist school school to budget. because of availability of the total number of student this can emphasize and make easier in making budget.

Help in HR management; also help in the management of the number of employee that are employed at a certain area for provision of service to them like healthcare and other service that are supposed to gain as a teacher on duties; Also in database management system there is disadvantage in school center, in case of using the database Management system the following are the disadvantages of using database management system in schooling;


9. It is difficult to make all total number of student that are contant and unchangable because there are Many students that come and out of the school this make database management system is ~~unchan~~ dynamic and not static

Affect budget of the school ; Database management may affect the budgets of the school in case the budgets of the school is made according to the number of present students in a school and even foreign students come into your school this will affect your budgets

Generally ; Database Management in school is very important, but must be ~~de~~ allow changes at all the time and not become stagnant.

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

The response of the candidate provided in extract 9.2 shows how the candidate failed to analyse the advantages and disadvantages of using database management systems in schools. The candidate also failed to give clear introduction and conclusion.

2.1.10 Question 10: IT and Environment

This was an optional question which carried a total of 15 marks. The question was "You have been asked to conduct training about the sources of computer damage to new staff employed by the Ministry of Education Science and Technology. Explain five possible sources that you will include in the presentation and give one preventive measure for each source".

The statistics shows that, 113 (36.5%) of the candidates attempted this question, of whom 46 (40.7%) scored from 0 to 5 marks, 46 (40.7%) scored 5.5 to 8.5 marks and 21 (18.6%) scored 9 to 15 out of the 15 marks allocated. Figure 10 summarises the candidates' performance on this question.

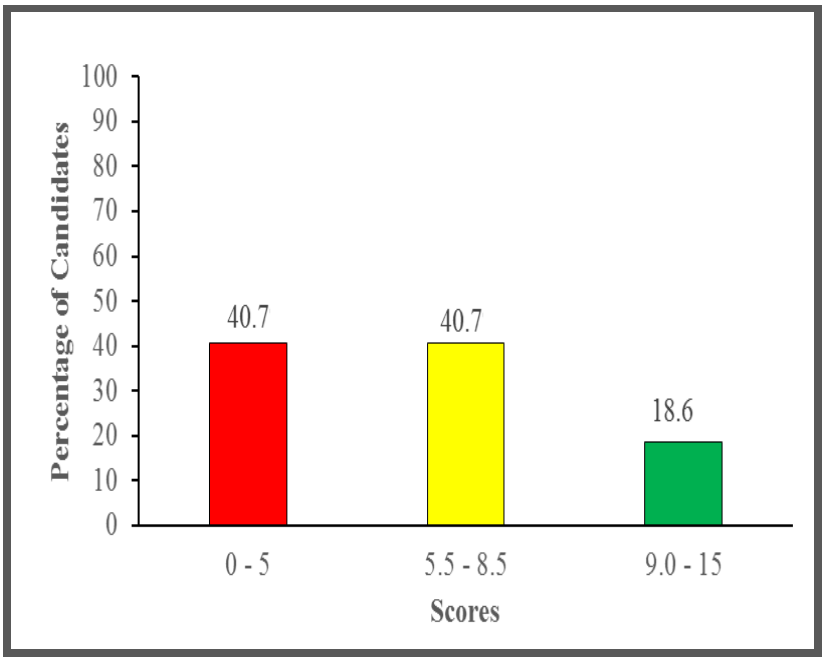
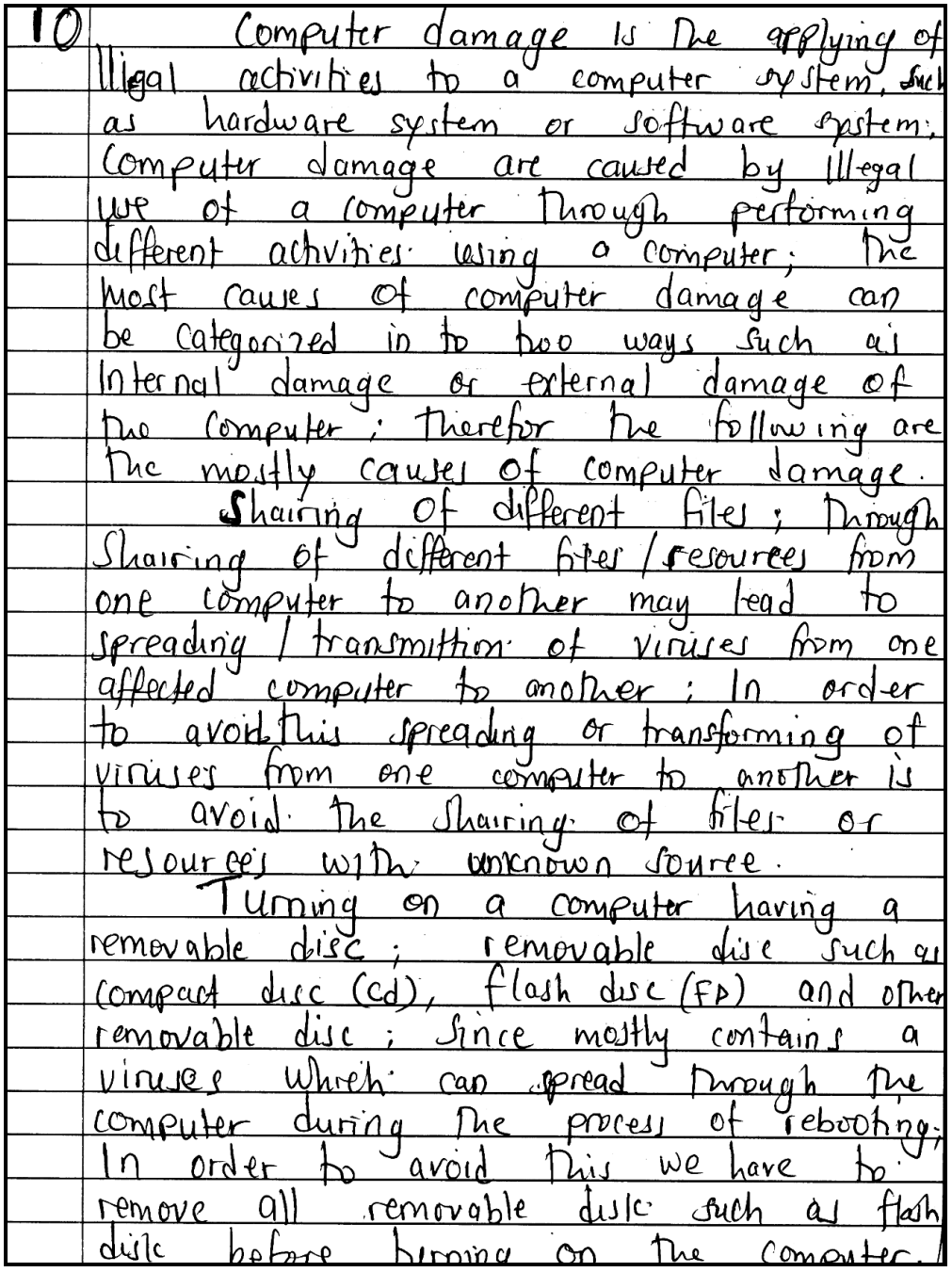


Figure 10: *The candidates' performance on question 10 of paper 1.*

The general performance of the candidates in this question was average as 59.3 per cent of the candidates scored above 5.5 marks. The analysis of the candidates' responses revealed that the candidates (40.7%) who scored low marks were able to list a few sources of computer damage but failed to explain them. Some of the candidates explained the presence of sunlight as a source of computer damage instead of excessive heat. For example, one of the candidates wrote; *placing a computer in the direction of sunlight* as the source of computer damage. This shows that the candidates failed to differentiate between the effect of excessive heat and the presence of sunlight to the computer. Other candidates wrote correct introduction but explained correctly only one source without providing a conclusion. Moreover, some of the candidates repeated to explain the same sources of computer damage. For example, one of the candidates wrote; *visiting and downloading files from unknown websites* and *sharing files via USB drive, opening attachment from unknown emails* as different sources of computer damage. The candidate did not realize that those two sources of computer damage fall under malware attacks. Other candidates gave the effects after damage of computer instead of sources of computer

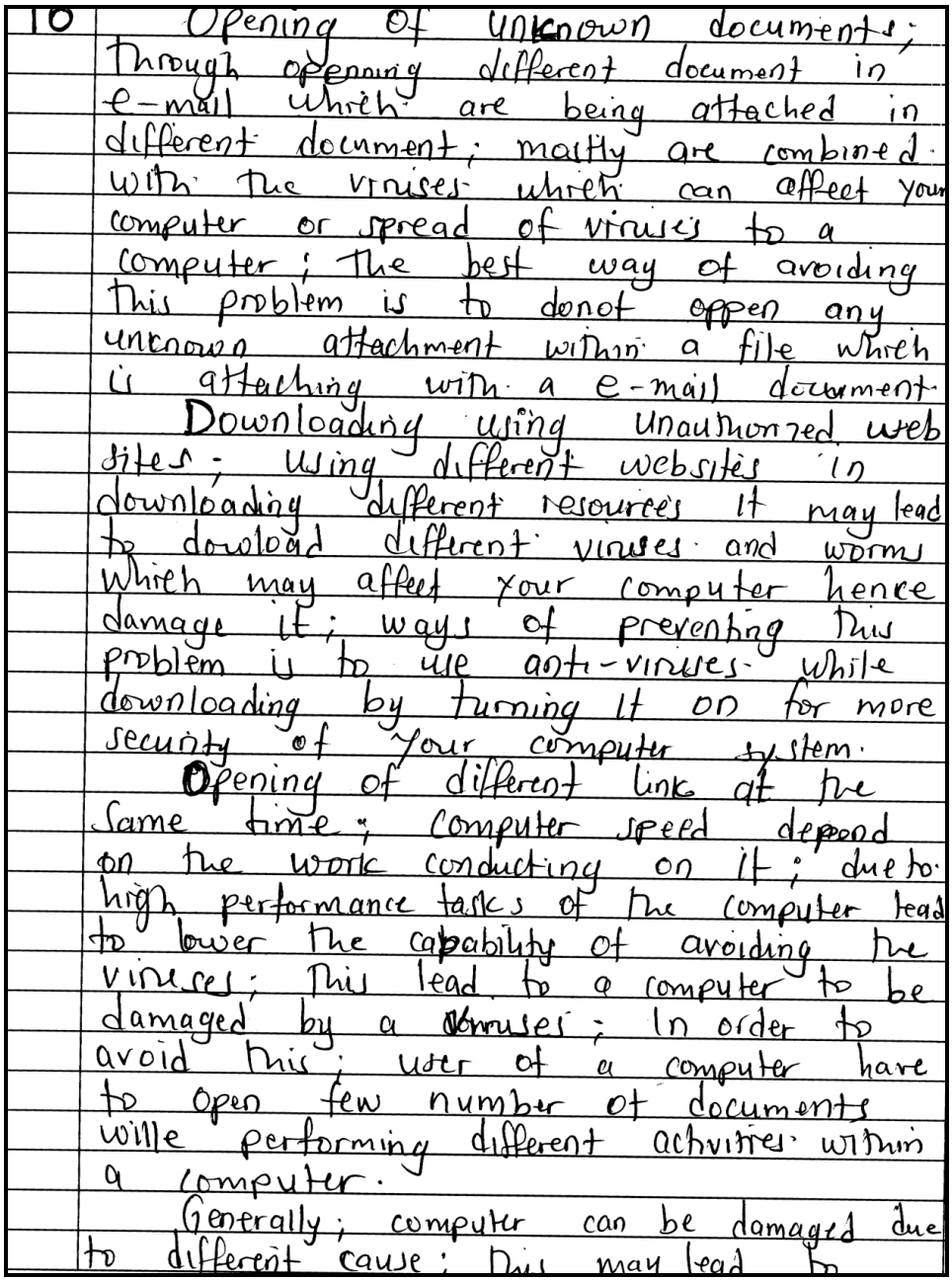
damage. For example, one of the candidates wrote; *Computer fail to load faster* as a source of computer damage. This signifies that the candidates did not understand the question. Extract 10.1 presents a sample of such incorrect responses.



10 Computer damage is the applying of illegal activities to a computer system, such as hardware system or software system. Computer damage are caused by illegal use of a computer through performing different activities using a computer; the most causes of computer damage can be categorized in to two ways such as internal damage or external damage of the computer; therefor the following are the mostly causes of computer damage.

Sharing of different files; through sharing of different files / resources from one computer to another may lead to spreading / transmition of viruses from one affected computer to another; in order to avoid this spreading or transforming of viruses from one computer to another is to avoid the sharing of files or resources with unknown source.

Turning on a computer having a removable disc; removable disc such as compact disc (cd), flash disc (FD) and other removable disc; since mostly contains a viruses which can spread through the computer during the process of rebooting; in order to avoid this we have to remove all removable disc such as flash disc before turning on the computer.


10 Opening of unknown documents; Through opening different document in e-mail which are being attached in different document; mostly are combined with the viruses which can affect your computer or spread of viruses to a computer; The best way of avoiding this problem is to donot oppen any unknown attachment within a file which is attaching with a e-mail document.

Downloading using unauthorized web sites; Using different websites in downloading different resources it may lead to download different viruses and worms which may affect your computer hence damage it; ways of preventing this problem is to use anti-viruses while downloading by turning it on for more security of your computer system.

Opening of different link at the same time; Computer speed depend on the work conducting on it; due to high performance tasks of the computer lead to lower the capability of avoiding the viruses; This lead to a computer to be damaged by a viruses; In order to avoid this; user of a computer have to open few number of documents wille performing different activities within a computer.

Generally; computer can be damaged due to different cause; This may lead to

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

Extract 10.1 shows a sample of a response from the candidate who gave unclear explanation on introduction with an incorrect conclusion. However, the candidate managed to write correctly only one source of computer damage with other incorrect sources.

Further analysis of the candidates' response shows that the candidates (40.7%) who scored average marks managed to explain the sources of computer damage but failed to describe the preventive measures for each source. The candidates also, failed to give the correct introduction and conclusion. Some of the candidates wrote correctly introduction and described correctly a few sources of computer damage without giving the conclusion. Other candidates gave a correct introduction and the conclusion with one or two correct sources failed to explain correctly other remaining sources of computer damage with their preventive measures. Moreover, some of the candidates managed to explain the sources of computer damage and gave correct preventive measures for each source of computer damage with wrong introduction and conclusion. Other candidates analysed correct sources of computer damage but failed to give clear explanations due to poor English language skills.

On the other hand, most of candidates (18.6%) who had high performance explained correctly sources of computer damage. They also managed to explain the preventive measures of each source of the computer damages. However, some of the candidates failed to explain clearly how those sources can damage the computer. Other candidates explained correctly the introduction and sources of computer damage with their preventive measures but failed to give the correct conclusion. Extract 10.2 presents a sample of correct responses.

10

Computer demage refers to the destruction of either hardware or software parts of the computer which leads to failure of the computer system to either work properly or fail to work completely. Possible sources of destruction both (either) hardware and software parts, generally computer damage and the measures to avoid them are explained below;

To begin with power fluctuations and power surges that may lead to electric~~al~~ shock or burning of computer devices ~~fuses~~, hence complete or partial demage.
This problem can be avoided (prevented) by use of Uninterruptible power supply (UPS) which regulates the power surges ensuring optimum ~~electri~~ amount of electricity to enter the computer at all the time.

Another source is overheating of the computer that is very fatal for hardware parts since they largely employ (or use) semiconductor devices that are very temperature sensitive.
This can be prevented by ensuring maximum ventillation in the room or place with the computer, avoiding using it while charging and use of air conditioners or electric fans.

Also dirty and dust is another prominent cause which includes chalk dust. These small particles enter the comp. uters ~~(C.P.U's)~~ (the C.P.U's of desktops) esp

10 ecially and cause damage.
It is avoided by constantly cleaning (by mopping) the area ~~with the~~ where the computer is situated to ensure it is shielded from dust. Also by enclosing it in a convinient cover when not in use.

Liquids like water, juice, soup and any other are very destrective to computers as they destort signal transmission in within.
This can be ~~avoid~~ avoided by keeping computers away from liquids and not drinking while using the computers.

Futhermore, malicious software like trojans, viruses and worms, these may destroy the computers software. They can be avoided by use of fire walls and antivirals programs and ayping other utility softwares.

On top of that, physical blow can badly damage computers, this happens when the computers fall or are hadly knocked, dleading to distortion of luternal structure.

Generally computer damage can be caused by various sources as explained above but the important things to do are also explained so its good to take note and observe them.

Extract 10.2: A sample of a correct answer to question 10 of paper 1

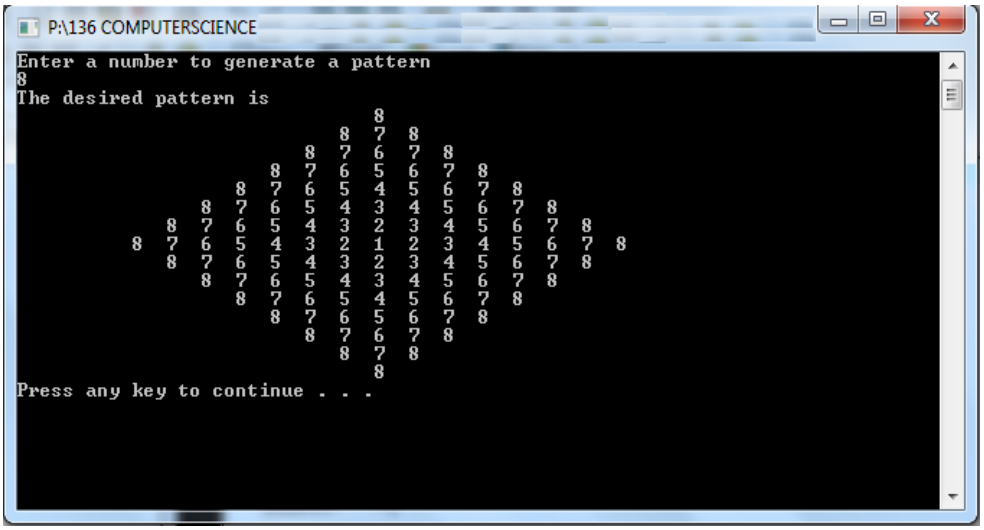
Extract 10.2 shows that the candidate who managed to give acorrect introduction and conclusion. The candidate also, explained correctly sources of computer damages with their preventive measures.

2.2 136/2 Computer Science 2

2.2.1 Question 1: C++ Programming

This was a compulsory question which weighed 25 marks. Candidates were required to;

(a) Construct a C++ program that generates the pattern given in the following screenshot;



HINT: (A user should enter any number which is less than 11 to generate the pattern).

(b) Construct a C++ program that finds the sum of the first *n* positive integers. The program should prompt the user to enter the number of terms to be added.

A total of 310 (100%) candidates attempted this question. Out of whom 131 (42.3%) scored from 0 to 8.5 marks, 136 (43.8%) scored 9 to 14.5 marks and 43 (13.9%) scored 15 to 25 out of the 25 marks allocated. Figure 11 illustrates the candidates' performance on this question.

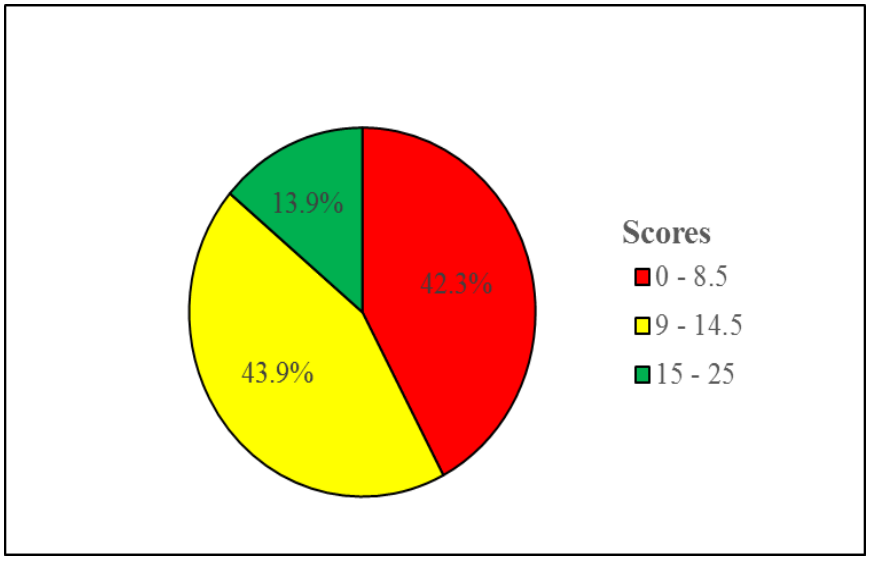


Figure 11: *The candidates' performance on question 1 of paper 2.*

The general performance in this question was average because 57.8 per cent of the candidates scored 9 marks or above. The analysis of candidates' responses shows that the candidates (13.9%) who scored high marks managed to type a C++ program to generate the number pattern given in the screenshot as the question required in part (a). However, some of the candidates used *if statement* to generate the pattern instead of a *loop condition*. This hindered them to score all marks in this part. Other candidates gave correct *outer loops* required for a program to prompt the user to enter a number of patterns but, they failed to give the *inner loops* required to generate the iteration of a particular number. Others typed correctly "outer loop" but failed to set the correct condition to produce the required pattern. This indicates that the candidates had insufficient knowledge of the uses of the loops in C++ programming.

Moreover, some of the candidates gave correct outer and inner loops, but they reversed the loop conditions which led them to display the inverted pattern of the numbers. A few candidates managed to write all correct codes to display the required pattern but could not restrict the user to enter the number less than 11. In part (b), the candidates managed to construct the C++ program that prompts the user to enter a number of positive integers to be added. However, some of the candidates used square brackets to open

and close a block of the codes instead of using curly brackets. This hindered the program to run successfully hence, they lost some marks. Other candidates could not type a statement to help the user to enter a number of terms. This led them to lose some marks. Extract 11.1 shows a sample of such correct responses.

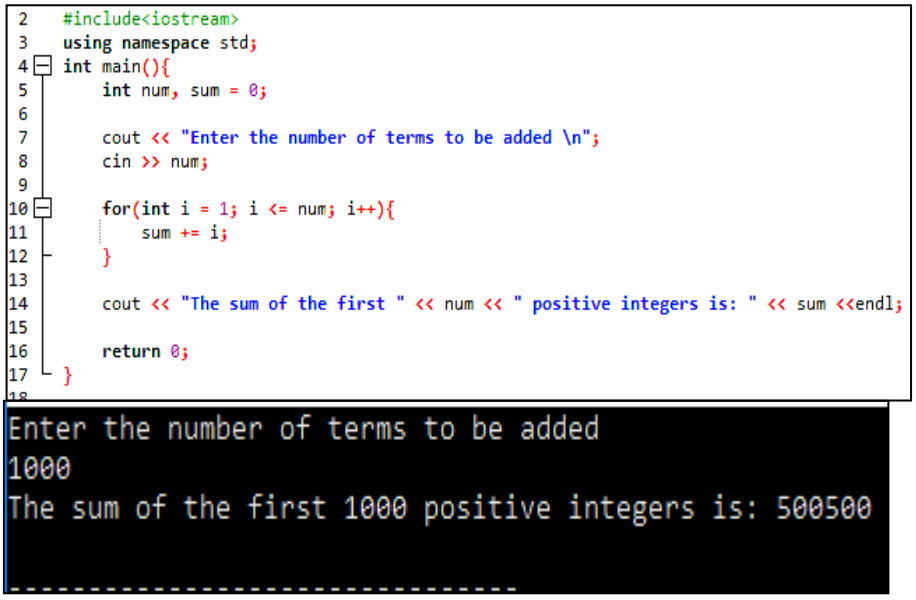
```
#include<iostream>
using namespace std;
int main(){
    int num;
    cout << "Enter a number to generate a pattern \n";
    cin >> num;

    for(int i = num; i >= 1; i--){
        for(int j = 1; j <= i; j++){
            cout <<"  ";
        }
        for(int k = num; k > i; k--){
            cout << k << " ";
        }
        for(int x = i; x <= num; x++){
            cout << x << " ";
        }
        cout << endl;
    }
    for(int i = 2; i <= num; i++){
        for(int j = 1; j <= i; j++){
            cout <<"  ";
        }
        for(int k = num; k > i; k--){
            cout << k << " ";
        }
        for(int x = i; x <= num; x++){
            cout << x << " ";
        }
        cout << endl;
    }

    return 0;
}
```

```
Enter a number to generate a pattern
9
                9
              9 8 9
            9 8 7 8 9
          9 8 7 6 7 8 9
        9 8 7 6 5 6 7 8 9
      9 8 7 6 5 4 5 6 7 8 9
    9 8 7 6 5 4 3 4 5 6 7 8 9
  9 8 7 6 5 4 3 2 3 4 5 6 7 8 9
    9 8 7 6 5 4 3 2 3 4 5 6 7 8 9
      9 8 7 6 5 4 3 4 5 6 7 8 9
        9 8 7 6 5 4 5 6 7 8 9
          9 8 7 6 5 6 7 8 9
            9 8 7 6 7 8 9
              9 8 7 8 9
                9 8 9
                  9

--------------------------------
```



```
#include<iostream>
using namespace std;
int main(){
    int num, sum = 0;

    cout << "Enter the number of terms to be added \n";
    cin >> num;

    for(int i = 1; i <= num; i++){
        sum += i;
    }

    cout << "The sum of the first " << num << " positive integers is: " << sum <<endl;

    return 0;
}
```

```
Enter the number of terms to be added
1000
The sum of the first 1000 positive integers is: 500500

--------------------------------
```

Extract 11.1: A sample of a correct answer to question 1 of paper 2.

Extract 11.1 shows that the candidate managed to use C++ program to generate the pattern using *for loop* condition in part (a). The candidate also managed to type all the required codes to sum the numbers in part (b).

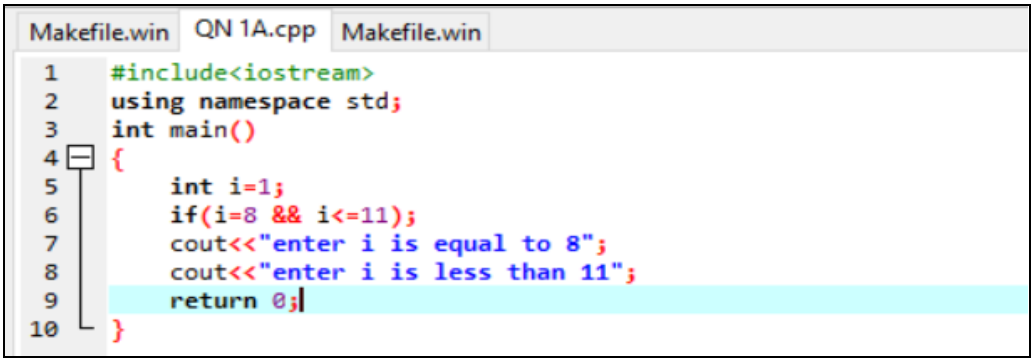
Further analysis showed that the candidates (43.9 %) who scored average marks managed to type the required codes to display the given pattern of numbers, but failed to type the correct syntax of the used loop in part (a). This made the program to fail to run successfully. In part (b), the candidates constructed correctly C++ programs that finds the sum of the first *n* integers and enabled the program to prompt the user to enter the number of terms as required. Some of the candidates failed to declare the variables required in the program in order to display a pattern of the number. Others could not set conditions on the *while* loop which led the program to produce an infinite loop. Moreover, some candidates designed a program to calculate the sum of n-terms in arithmetic progression by prompting the user to enter the first term, n^{th} term and the common difference instead of finding the sum of the first *n* positive integers. This implies that the candidate did not understand the requirement of the question. It was noted that there were candidates constructed a program which adds the fixed entered numbers.by the user

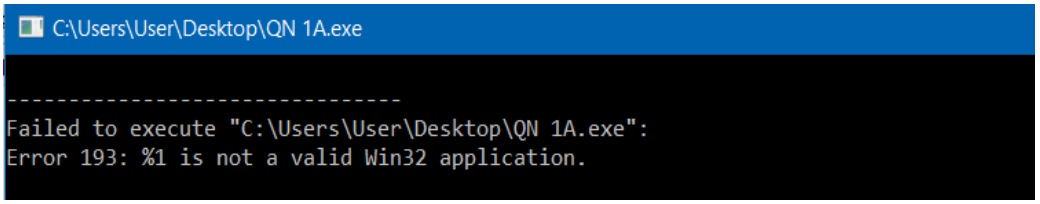
instead of using a loop to sum the first *n* integers. For example, one candidate wrote;

```
int a, b, n;
cout<<"enter first number:";
cin>>a;
cout<<"enter second number:";
cin>>b;
n=a+b;
cout<<"n is a sum:"<<n<<endl;
```

Furthermore, some of the candidates (42.3%) who scored low marks were able to type only the introduction part of the program in part (a). Some candidates used *Cout statements* to generate the given number patterns instead of the *loop condition*. This indicates that the candidate lacked knowledge of applying the *looping condition* in a C++ programming. Other candidates managed to initialise the loop but failed to complete the body part of the loop. In part (b), some of the candidates managed to declare the variables and to use loops and *if statement* but, they failed to write the correct formula to sum the entered numbers. On the other hand, some of the candidates used wrong application software to type the codes. For example, one candidate used the word processor to type the code of C++ program. This shows that the candidate lacked knowledge of using the compiler platform to type the program. Others typed a C++ program which is contrary to the question. For example, one candidate typed C++ program to display the star (*****) shapes. This shows that the candidates did not understand the requirement of the question. Extract 11.2 shows a sample of an incorrect answer from one of the candidates.

(a)

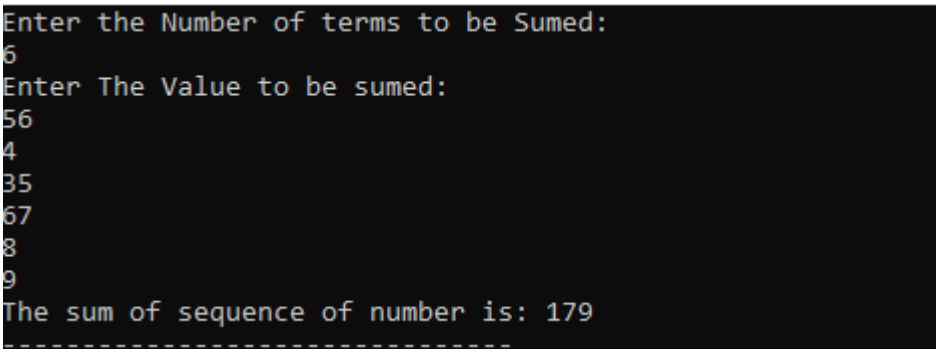




(b)

```
#include<iostream>
using namespace std;
int main ()
{
        int n, a, Sum, d;
        cout<<"Enter the Number of terms to be Summed:"<<"\n";
        cin>>n;
        cout<<"Enter The Value to be summed:"<<"\n";
        for(int i=0;i<n;i++)
         {
          int A[n];

          cin>>A[i];
           Sum += A[i];
          }
         cout<<"The sum of sequence of number is: "<<Sum;
          return 0;
}
```



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

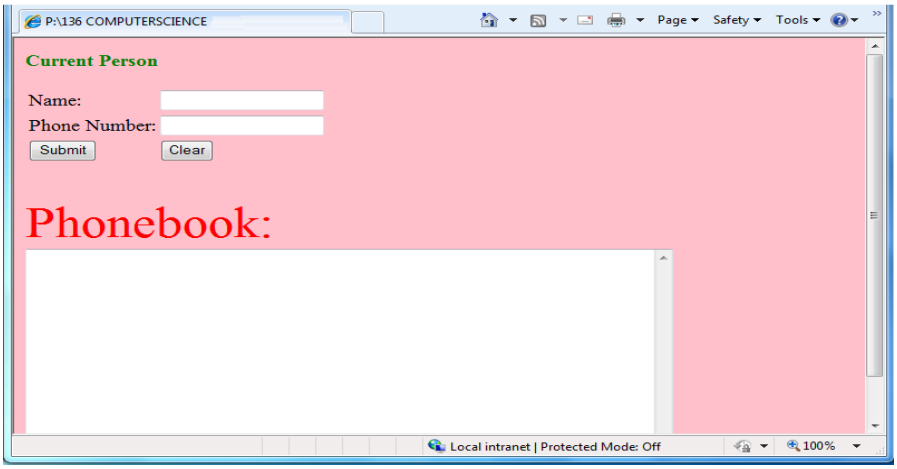
Extract 11.2 shows a sample of a response from one of the candidates who failed to type the correct codes required to display number pattern in part

(a). In part (b), the candidate created a program which sums numbers entered by the user instead of finding the sum of the first *n* positive integers.

2.2.2 Question 2: Website Development

This was an optional question which carried a total of 25 marks. The candidates were required to;

(a) Use basic HTML and JavaScript codes to design a phonebook which will enable a user to submit the name and the telephone number. The entries should be displayed in the textarea after clicking a command button "Submit" and disappear when a user clicks a command button "Clear". The interface of the phonebook is given in the following screenshot:



Phonebook description:

- Font size and colour of the heading "Current Person" should be h3 and green respectively.
- Font size and colour of the word "Phonebook" should be 15 and red respectively.
- Background colour of the body should be pink.
- The width and height of textarea must be 15 and 70 spectively.

(b) Use the basic HTML and JavaScript codes to design a picture gallery which can enable a user to magnify a picture after clicking the desired

picture. The gallery should display a message “Click a Picture” after clicking the command button “Click Me to Magnify”. The picture gallery should be as follows:

HINT: (Use your favourite images from the pictures folder available in your computer).

Gallery description:

- The width and height of each picture should be 170px and 150px respectively.
- The table border should be 1.

A total of 295 (95.2%) candidates attempted this question, out of whom 81 (27.5%) scored from 0 to 8.5 marks, 157 (53.2%) scored 9 to 14.5 marks and 57 (19.3%) scored 15 to 25 out of the 25 marks allocated. The general performance for this question was good as 72.5

per cent of the candidates scored 8.5 marks or above. Figure 12 illustrates the candidates' performance in this question.

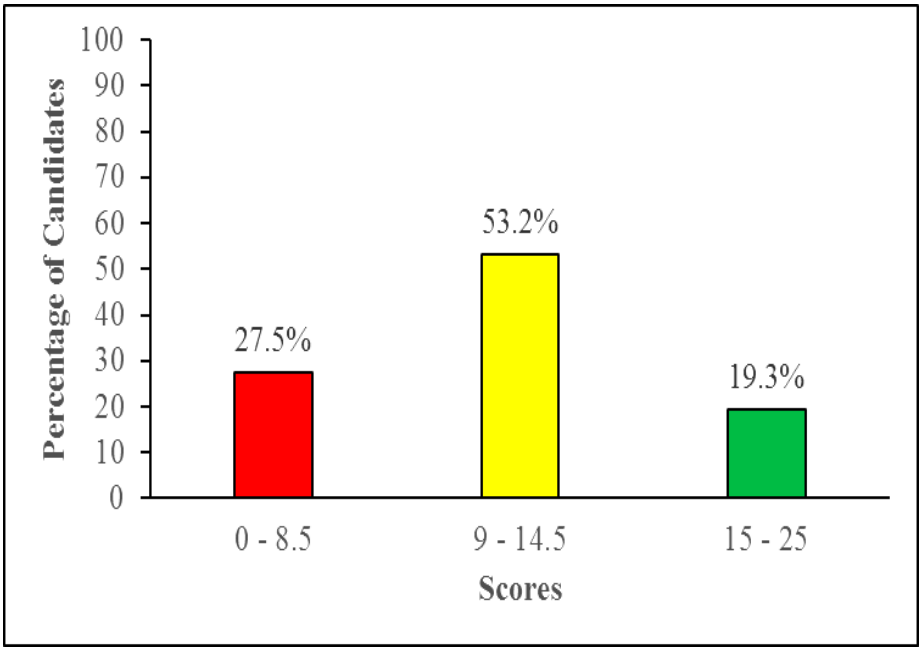


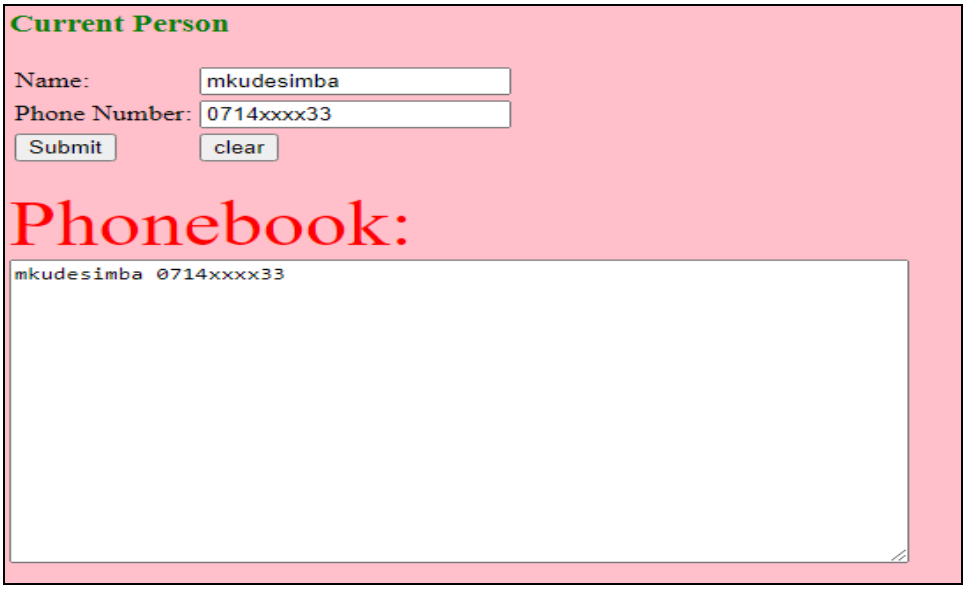
Figure 12: *The candidates' performance on question 2 of paper 2.*

The analysis showed that the candidates (19.3%) who scored high marks managed to design the given phonebook using HTML and JavaScript codes in part (a). They also designed correctly a picture gallery using HTML and JavaScript codes with the specified description in part (b). However, some of the candidates failed to enable "clear button" that deletes the contents displayed in textarea. Other candidates managed to display the textarea but failed to include the required dimensions. These candidates typed the width and height dimensions instead of columns and rows. Moreover, some of the candidates wrote JavaScript code to submit the name and phone number into the textarea with incorrect syntax which led them to lose some marks. In part (b), some of the candidates linked one picture and another instead of applying JavaScript codes to magnify them. This indicates that the candidate did not understand the requirements of the question. Furthermore, some candidates did not include the picture used in a webpage in the same folder. Hence, the picture failed to display on the webpage. Extract 12.1 shows a sample of the correct response from one of the candidates.

```
<html>
<head>
<title>P:\136COMPUTERSCIENCE</title>
<script>
    function process(){
        var x=document.getElementById("tx1").value;
        var y=document.getElementById("tx2").value;
        document.getElementById("tx3").value=x+" "+y;
}
</script>
</head>
<body bgcolor="pink">
<form >
<h3><font color="green">Current Person</font></h3>
<table>
    <tr>
     <td>Name:</td>
      <td><input type="text" id="tx1"></td>
    </tr>
    <tr>
     <td>Phone Number:</td>
      <td><input type="text" id="tx2"></td>
    </tr>
     <tr>
     <td><input type="button" value="Submit" onclick="process()"></td>
      <td><input type="reset" value="clear"></td>
    </tr>
</table>

<p><font color="red" size="15">Phonebook:</font><br>
<textarea id="tx3" rows="15" cols="70"></textarea></p>

</form>
</body>
</html>
```



```
<html><head><title></title><script>
            let per;;
            function msg_disp(){
                alert("Click a Picture");}
            function magnify_k(){
                let koala = document.getElementById("koala");
                koala.style.zoom = 2;}
            function magnify_l(){
                let lhouse = document.getElementById("lhouse");
                lhouse.style.zoom = 2;}
            function magnify_p(){
                let penguins = document.getElementById("penguins");
                penguins.style.zoom = 2;}
            function magnify_t(){
                let tulips = document.getElementById("tulips");
                tulips.style.zoom = 2;}
        </script></head>=<body>
        <table border = "1" id = "tbl">
<tr><th colspan = "2">Picture Gallery</th></tr><tr>
<td><img src = "file:///C:/Users/Public/Pictures/Sample%20Pictures/Koala.jpg"
id = "koala" width = "170px" height = "150px" onclick = "magnify_k()"/></td>
<td><img src = "file:///C:/Users/Public/Pictures/Sample%20Pictures/Lighthouse.jpg"
id = "lhouse" width = "170px" height = "150px" onclick = "magnify_l()"/></td></tr>
<tr><td><img src = "file:///C:/Users/Public/Pictures/Sample%20Pictures/Penguins.jpg"
id = "penguins" width = "170px" height = "150px" onclick = "magnify_p()"/></td>
<td><img src = "file:///C:/Users/Public/Pictures/Sample%20Pictures/Tulips.jpg"
id = "tulips" width = "170px" height = "150px" onclick = "magnify_t()"/></td>
</tr><tr>
<td colspan = "2" align = "center"><input type = "submit"
value = "Click Me to Magnify" onclick = "msg_disp()"/></td>
</tr></table></body></html>
```

Extract 12.1: A sample of a correct answer to question 1 of paper 2.

Extract 12.1 shows a sample of the correct response. The candidate managed to use HTML and JavaScript codes to design the required phonebook in part (a). The candidate also managed to design a picture gallery using HTML and JavaScript codes.

Moreover, the candidates (53.2%) who scored average marks were able to generate the phonebook with the correct background colour, font colour and submit button in part (a). Some of the candidates displayed correctly the textarea but failed to include the required dimensions and to type the correct codes that displayed a "clear" button. Other candidates were able to initiate JavaScript code but failed to write the correct function to capture input data from text boxes to the textarea. This shows that the candidate had insufficient knowledge of JavaScript. However, some of the candidates did not type form tags which include text boxes and the textarea. This indicates that the candidate lacked knowledge of correct syntax on designing HTML form. In part (b), most candidates were able to create the picture gallery interface with all required details by using HTML codes. But, they failed to write the JavaScript codes for magnifying the pictures. Other candidates displayed pictures without including tables. They also failed to merge the table column using colspan attribute. This signifies that the candidates had partial understanding of designing tables using HTML codes. Furthermore, some of the candidates inverted the required procedure in the page designing. The candidates prompt the user to select an image followed by clicking the message "click me to magnify" instead of clicking the image directly to magnify. A few candidates used the cascading style sheet (CSS) instead of the JavaScript programming language in designing. This indicates that the candidates did not understand the requirement of the question.

On the other hand, some of the candidates (27.5%) who scored low marks typed only a few codes to initiate the HTML page but failed to design the input fields, submit buttons and the reset button. These candidates failed to define some HTML attributes including font colour, font size and background colour. The candidates also failed to activate the page using JavaScript codes in part (a). Some of the candidates typed HTML code with incorrect syntax. For example, one candidate typed; *"<input type=" clear" value="clear">"*. This signifies that the candidate failed to

differentiate attribute reset from a label “clear”. In part (b), the candidates were able to type open and close html tags but failed to type tags for creating tables, inserting images within a table and linking them with JavaScript codes to magnify the inserted pictures. This shows that the candidates lacked skills of creating html tables as well as inserting images on a webpage. Extract 12.2 shows a sample of incorrect answers from one of the candidates.

```
Html
<h3>current person bg colour = green </h3>
<body> background-color = pink
<label> Name input type = box = right-side </label>
<label> phone number inpute type = box = right-side </label>
<p1> phonebook </p1>
<label> Width area = 15 and Height area = 70 </label>
</body>
</html>
```

```
!DOCTYPE<HTML>
<HTML>
<title>picture gallery</title>
<heading>

<body>\

<h>table,width170px and height150px, borde1\
Insert picture gallery in table/
click me to magnify</h>
</html>
</heading>
</body>
```

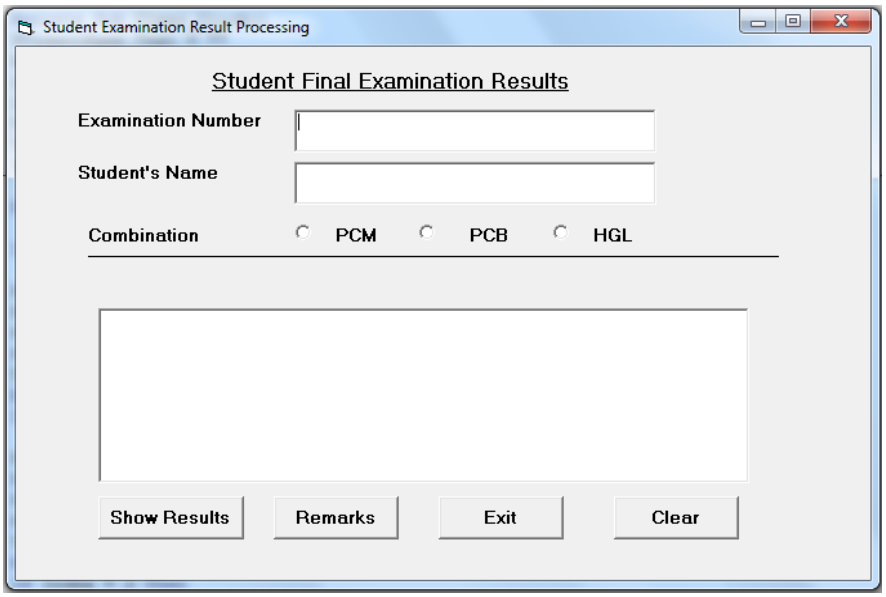
Extract 12.2: A sample of a correct answer to question 2 of paper 2.

Extract 12.2 shows a sample of lines of codes from a candidate who failed to interface in part (a). Also, the candidates failed to use JavaScript and html codes to magnify the image in part (b).

2.2.3 Question 3: Visual Programming

This question tested the candidates' ability in creating and activating the interface using Visual Programming language. The candidates were required to: -

(a) Use Visual Basic program to design the following "Students Examination Result Processing" interface:



Interface Description:

- The height and width of the form must be 6690 and 10185 respectively.
- The option buttons for combinations should be in form of control array with the name "Comb" and index 0, 1, and 2 respectively.
- The width and height of the ListBox control named List1 is 7455 and 2010 respectively.

- PCM stands for Physics, Chemistry and Advanced Mathematics.
- PCB stands for Physics, Chemistry and Biology.
- HGL stands for History, Geography and Language.

(i) Add six Textbox controls to the interface named P1, P2, P3, P4, Text2 and Text3. Change the visible properties for these controls to "False" so that they are hidden when the program runs.

(ii) Add a label having an *empty* caption to the interface just below the horizontal line and name it Label4. Change the height and width properties of Label4 to 375 and 8295 respectively.

(b) Use Visual Basic codes to activate the interface created in part (a) in order to perform the following tasks:

(i) Prompt a user to enter marks for each subject in a selected combination. The General Studies subject is compulsory for all students. The combination options should be stored in the textboxes named "Text2" as PCM, PCB or HGL and the entered marks should be stored in the Textboxes P1, P2, P3 and P4.

(ii) Display on Label4 caption a message "Results for Examination Number, Student Name and Combination." Where by Examination Number, Student Name and Combination are the inputs entered by the user.

(iii) Find the average of the marks stored in textboxes P1, P2, P3 and P4 and store in a textbox named "Text3".

(iv) Display in List1 the subject name with their respective marks entered and the average marks when a user clicks the command button "Show Results".

(v) Give a message "Congratulations! You have passed to join the University" if the average is greater or equal to 40% otherwise it should give a message "Sorry your average is less than 40! Please re-sit the exam" when a command button "Remarks" is clicked.

(vi) Exit the program when a user clicks an "Exit" button.

(vii) Clear all the visible inputs and the outputs when a user clicks a "Clear" button.

This question was skipped by many candidates as only 13 (4.2%) candidates attempted it. Out of whom 10 (76.9%) scored from 0 to 8.5 marks, 2 (15.4%) scored 9 to 14.5 marks and only one candidate (7.7%) scored 23.5 out of the 25 marks allocated. The general performance in this question was poor as 76.9 per cent of the candidates scored below 8.5 marks. Figure 13 illustrates the candidates' performance in this question.

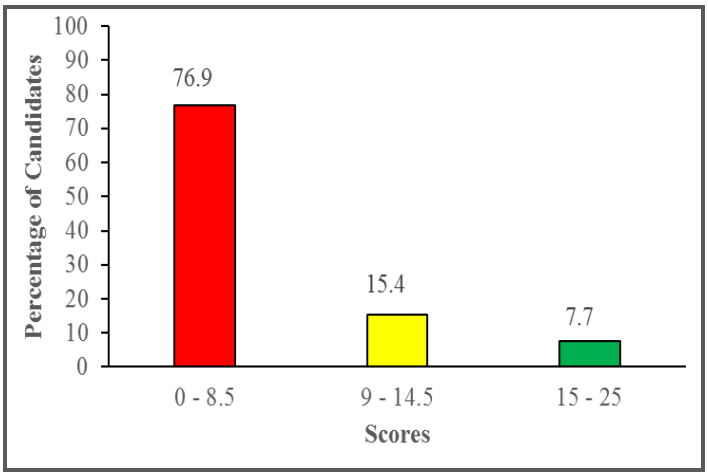


Figure 13: *The candidates' performance on question 3 of paper 2.*

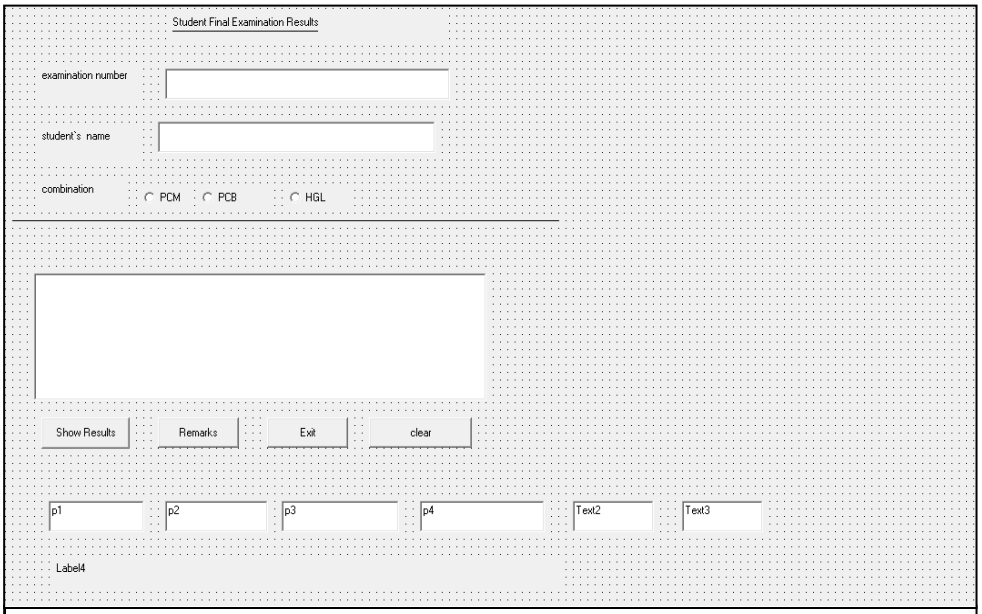
The analysis shows that, majority of the candidates (76.9%) who scored low marks from 0 to 8.5 managed to design the given visual basic interfaces as required but failed to type any line of visual basic codes. Some of the candidates designed visual basic interface with all controls from the screenshot but failed to add more controls stated in the interface description in part (a). Other candidates managed to design, resize and hide or unhide controls but they typed visual basic codes using incorrect syntax. For instance, one of the candidates typed the following codes to display average on List1 control: *List1.subject name. Average mark=subject name. Average marks "show results"*. It was noted that there were candidates who presented the automatic codes generated by the Visual Studio framework. These candidates edited the names of the

command but failed to type the codes required to activate the page. For example, one of the candidates typed:

Private sub P1_textChanged(ByVal sender As System,Object,ByVal e As System.EventArgs) Handles P1.TextChanged

End Sub.

This signifies that, the candidate had insuffient knowledge of designing page using visual basic codes. Other candidates designed correctly the interface and activated only a few controls using simple codes, such as close or end the program when an exit command button is clicked. But, they failed to type all the required visual basic codes. Extract 13.2 shows a sample of an incorrect answer from one of the candidates.




```
rivate Sub command_click()
ext2.Text =text2.text"PCM,PCB or HGL"
1.P2.P3.P4.text=P1.P2.P3.P4.text"MARKS"
nd Sub

rivate Sub command_click()
abel4.text=label4.text"examination number and student name"
nd Sub

rivate Sub command_click()
verage.text=P1.P2.P3.P4.text"text3"
nd Sub

rivate Sub command_click()
ist1.subject name.average mark=subject name.average marks"show results"
nd Sub


rivate Sub command_click()
congratulation! youhavepassedtojointheUniversity"ifttheaverageisgreaterorequalto40%."sorryyouraverageislessthan40!pleasei
nd Sub
rivate Sub command_click()
xit the program.text="Exit"
nd Sub
rivate Sub command_click()
lear all the visible inputs ande output when a user clicks="clear"
nd Sub
```

Extract 12.2 shows a sample of responses from a candidate who managed to design the required interface. However, the candidate typed incorrect visual basic codes to activate the interface.

On the other hand, the candidates (15.4%) who scored average marks created correctly the given interface in part (a). They also managed to activate some of the controls using visual basic codes in part (b). These candidates activated a program to add data from a user into invisible controls and used them to calculate the average and generated remarks. However, they failed to display Registration Number, Name and Combination in label4 as instructed in part b (ii). This signifies that, the candidate lacked sufficient knowledge in visual basic programming. Furthermore, one candidate managed to type visual basic codes to prompt user input and displayed remarks message. But, the candidate failed to display the results of students in the list.

Further analysis of candidates' response shows that only one candidate scored high marks. This candidate managed to design interface and activated correctly all controls on the interface using visual basic codes. Also, the candidate managed to add a control array of option button as instructed in part (a). Moreover, the candidate automated all controls with visual basic codes to display the required task in part (b). However, the candidate did not include the percentage (%) symbol in the students' marks displayed. Hence, the candidate lost some marks.

3.0 PERFORMANCE OF THE CANDIDATES PER TOPIC

The analysis done in relation to each topic shows that the candidates performed well in two (2) topics, averagely in three (3) topics and weak in five (5) topics. The candidates performed well in the topics of *Information System* (73.3%) and *Computer Basics* (64.8%). The good performance is a result of the correct interpretation of the questions and the candidates' good practical skills. The candidates' performance was average on the topics of *Website Development* (58%), *IT Environment* (54.4%) and *Data Representation* (41.3%). This performance was due to inadequate knowledge on the concepts taught under this topic. The candidates' performance was weak in the topics based on *C++ Programming* (33.1%), *Data Communication and Networking* (25.8%), *Visual*

Programming (12.4%) and *Data Structure and Algorithm* (9%). The poor performance in these topics is attributed to the candidate's lack of practical skills on the topics. The *Appendix* shows the performance of the candidates in each topic.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The analysis of candidates' performance in Computer Science in ACSEE 2021 has shown that out of the 9 topics which were examined 2 topics had good performance, 3 topics had average performance and 4 topics had weak performance. Therefore, the overall performance on Computer Science in 2021 was average. The analysis of the candidates' responses indicated that the candidates had difficulties in answering questions from the *C++ Programming*, *Data Communication and Networking*, *Visual Programming* and *Data Structure and Algorithm* topics. The weak performance in the four 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 in the future Computer Science examination the following are recommended:

(a) Teachers should guide the students to develop visual basic programs practically.

(b) Teachers should encourage the students to practise designing program using C++ programming language.

(c) Teachers should provide students with more exercises and tests to enhance their mastery of both theoretical concepts and practical skills of programming languages.

(d) Different techniques should be employed by the teachers to make students understand the concepts of pointers, records and array data structure.

(e) Students should be guided to explain various data transmission media and their uses in a real life.

(f) Teachers should led students to discuss how IT interacts with the environment in our daily-life.

(g) Teachers should led students to practice on the use of HTML and JavaScripts.

(h) Students should do adequate exercises on converting number from one system to another.

APPENDIX

Analysis of Candidates' Performance per Topic

S/N	Topic	Number of Questions	Per centage of Candidates who Scored 35% Marks or Above	Remarks
1	Information Systems	1	73.3	Good
2	Computer Basics	1	64.8	Good
3	Website Development	2	58	Average
4	IT and Environment	2	54.4	Average
5	Data Representation	1	41.3	Average
6	C++ Programming	2	33.1	Weak
7	Data Communication and Networking	1	25.8	Weak
8	Visual Programming	2	12.4	Weak
9	Data Structure and Algorithm	1	9	Weak