THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

EXAMINERS' REPORT ON THE PERFORMANCE OF CANDIDATES

ACSEE, 2014

136 COMPUTER SCIENCE

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FOREWORD

The Computer Science Examiners' Report on the Advanced Certificate of Secondary Education Examinations (ACSEE) 2014 was written in order to provide feedback to candidates, teachers, parents, policy makers and other educational stakeholders on the candidates' performance. Computer Science is among of the subjects which have a good performance. The report has therefore, tried to reveal a number of factors that might have attributed to this performance.

The Advanced Certificate of Secondary Education Examination marks the end of two years of secondary education. It is a summative evaluation which among other things shows the effectiveness of the education system in general and education delivery system in particular. Essentially, candidates' responses to the examination questions is a strong indicator of what the education system was able or unable to offer to the candidates in their two years of Advanced Secondary Education.

The analysis presented in this report is intended to contribute towards understanding some of the reasons behind the performance of candidates. The report highlights some of the factors that made some of the candidates fail to score high marks. Such factors include failure to identify the task of the question, inability to express themselves in English Language and lack of knowledge on the concepts related to the subject. The general performance was good, this might be attributed by clear knowledge on the concepts related to the subject and understanding of the question requirements. The feedback provided will enable the educational administrators, school managers, teachers and candidates to identify measures to be taken in order to improve candidates' performance in future examinations administered by the Council.

Finally, the Council would like to thank all the Examination Officers, examiners and all who participated in the preparation of this report.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

The report on Computer Science is based on the analysis of the candidates' performance who sat for the advanced certificate of secondary education examination (ACSEE) in 2014. The examination measured the general competences which are stipulated in the syllabus and adhered to the 2011 Examination Format.

The subject had two papers which are theory and practical. The theory paper had two (2) sections, namely A and B. Section A consisted of ten questions, which were compulsory and Section B had three questions of which the candidates had to attempt any two. The practical paper had three questions of which the candidates were required to attempt any two questions including the first question.

A total of 95 candidates sat for the ACSEE 2014 in Computer Science, out of which 94 candidates (98.95%) passed the examination and one candidate (1.05%) failed. In 2013, 95 candidates sat for examinations and 80.43 percent passed while 19.57 percent failed. This indicates that the rate of performance in the year 2014 has increased by 18.52 percent.

In this analysis, a question in a topic is categorized as poorly performed, moderately performed or well performed if the percentage of the candidates who scored the average of 30 percent and above is from 0 - 29, 30 - 49 and 50 - 100 respectively.

In this report, candidates' performance has been analysed by showing the question demands, what candidates were able to do and it identifies the mistakes made by candidates while attempting the questions. Furthermore, the extracts for both good and poor responses from the candidates have been inserted to illustrate the cases presented.

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE PER QUESTION

2.1 Paper 1: Theory

2.1.1 Question 1: Data Communication and Networking

In this question, the candidates were required to; (a) Explain the concept of bus topology and its advantages and (b) Describe types of transmission media by giving examples for each type.

A total of 95 candidates (100%) attempted this question out of which 3.2 percent scored a zero mark, 28.4 percent scored from 0.5 to 2.5 marks and 63.1 percent scored from 3 to 5.5 out of 6 marks. However 5.3 percent scored full (6) marks. The general performance for this question was therefore good.

Most candidates responded correctly to this question in both parts. The candidates who performed well had sufficient knowledge on concepts taught under the topic of Data Communication and Networking as they managed to explain the concept of bus topology and to describe types of transmission media correctly. Extract 1.1 represents a sample of good response which was provided by one of the candidates.

Extract 1.1

1 (a) Bus topology.

This refers to the topogy in networks where, computers or devices are all connected to a main backbone of wire

Data sent by any computer, goes to the main backbone and any node with the adress required gets the ~~Aformat~~ data signal, after data passing through the main backbone wire.

The ends of the topology are called terminals.

Advantages of bus topology

Easy and convinient to install.

It is cheap as materials (wires, cables) required aren't expensive.

1 (b) Bounded or wire transmission.

This transmitcan media, are in forms of wires and cables.

They include, twisted pair wires (cables) coaxial cables, fibre optic caples and two open wire cables.

Example. The cable connecting the TV-set to antennae is a coaxicel cable.

Unbounded transmittion or wirless transmitting

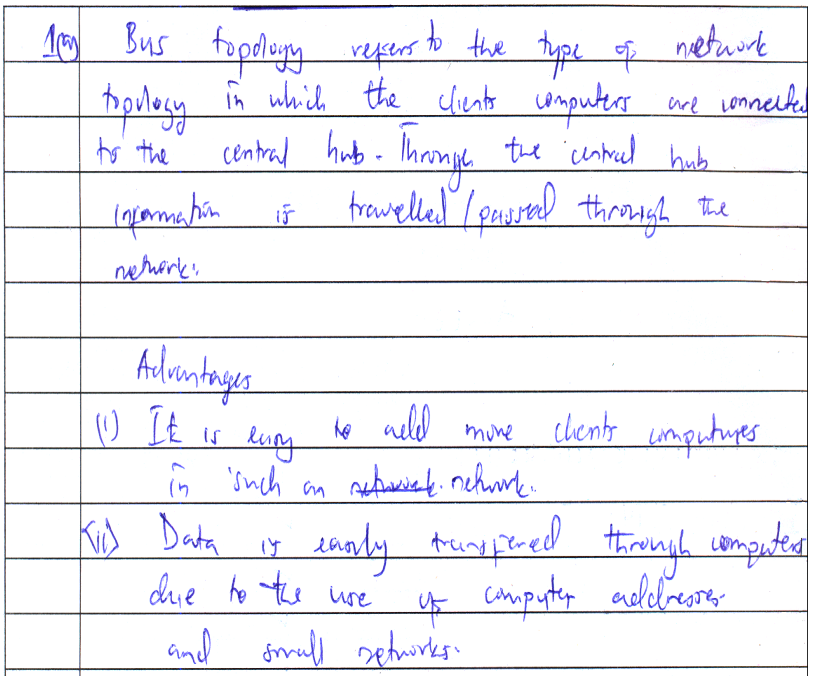
This transmission media is via electromagnetic waves.

Example, bluetooth technology, infared, microwaves, satelites, and so on.

In extract 1.1, the candidate presented a correct concept of bus topology and its advantages. He/she also described the two transmission media clearly.

The candidates who scored low marks in this question failed to explain correctly the concept of bus topology and its advantages. Some of them concentrated on sketching a diagram and defining the bus topology which was not required of. Other candidates misinterpreted the concept of transmission media with mass media. For instance, one candidate wrote about newspapers, magazines and televisions as types of transmission media instead of bound and unbound media. This indicates that candidates' had inadequate knowledge about the concept of bus topology and the key meaning of the term "concept" as well as transmission media. Extract 1.2 represents a sample of the candidates' poor response.

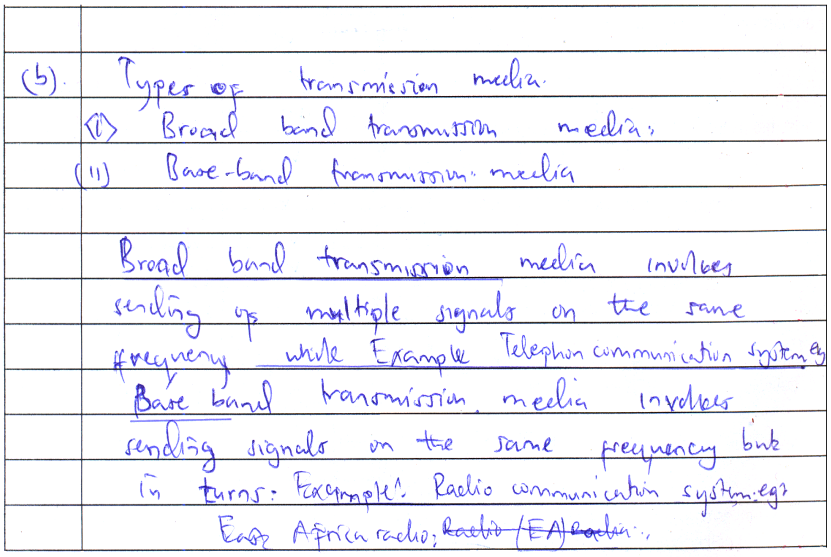
Extract 1.2


1(a) Bus topology refers to the type of network topology in which the clients computers are connected to the central hub. Through the central hub information is travelled / passed through the network.

Advantages

(i) It is easy to add more clients computers in such an ~~network~~ network.

(ii) Data is easily transferred through computers due to the use of computer addresses and small networks.



In extract 1.2 the candidate failed to categorise bus topology from other types of topology and gave wrong answers. This indicates that a candidate lacked knowledge on bus topology and transmission media.

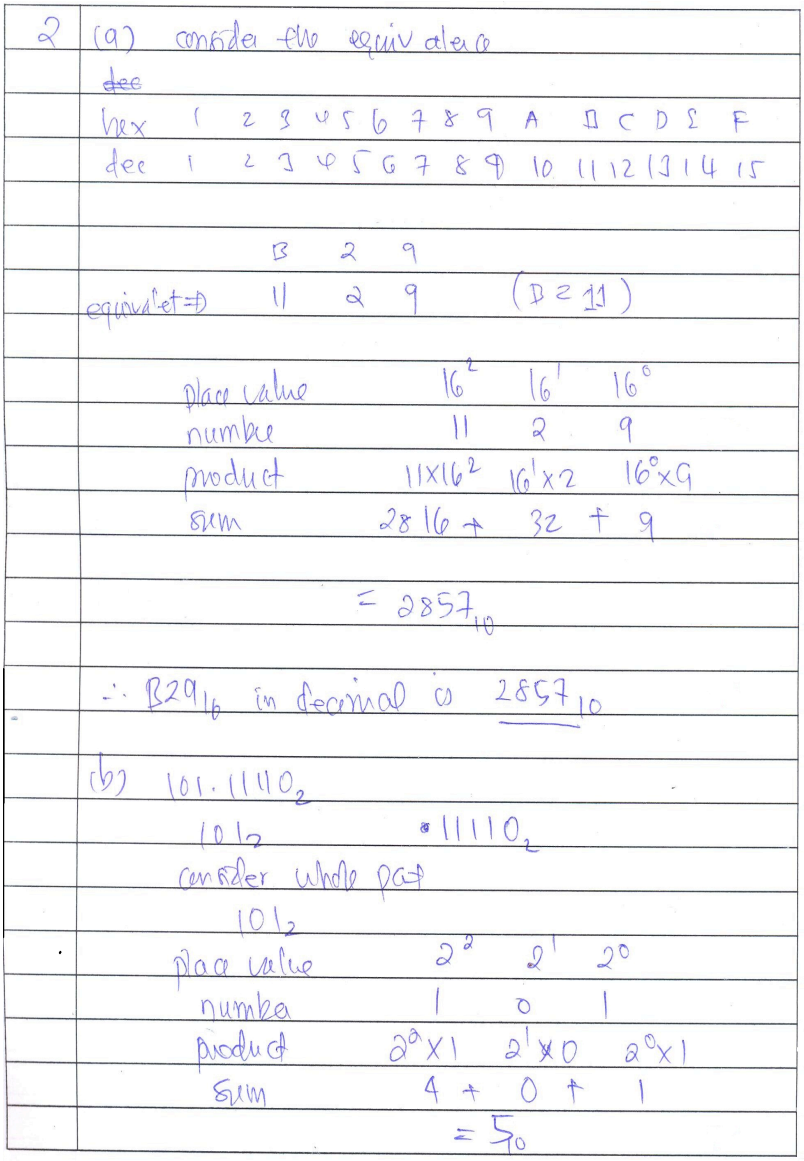
2.1.2 Question 2: Data Presentation

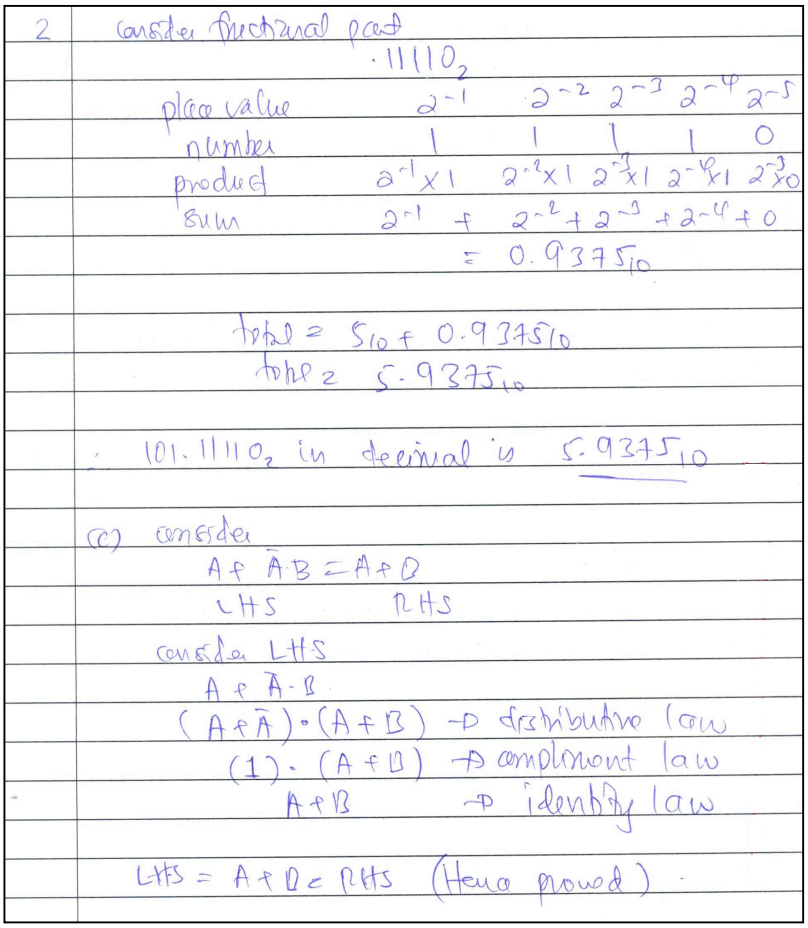
In this question candidates were required to; (a) convert hexadecimal number $B29_{16}$ to its decimal equivalent, (b) convert 101.11110_2 to its decimal equivalent and (c) use Boolean laws of algebra to prove the Boolean expression $A + \overline{A}B = A + B$.

A total of 94 candidates (98.9%) attempted this question, out of which 2.1 percent scored a zero mark, 31.9 percent scored from 0.5 to 2.5 marks and 46.9 percent scored from 3 to 5.5 out of 6 marks. However, 19.1 percent scored full marks indicating that the general performance for this question was good.

The candidates who performed well had adequate knowledge on data representation as they managed to convert hexadecimal and binary numbers to decimal equivalent. Also were able to use Boolean laws of algebra to prove the given Boolean expression. Extract 2.1 represents a sample of a good answer provided by a candidate.

Extract 2.1

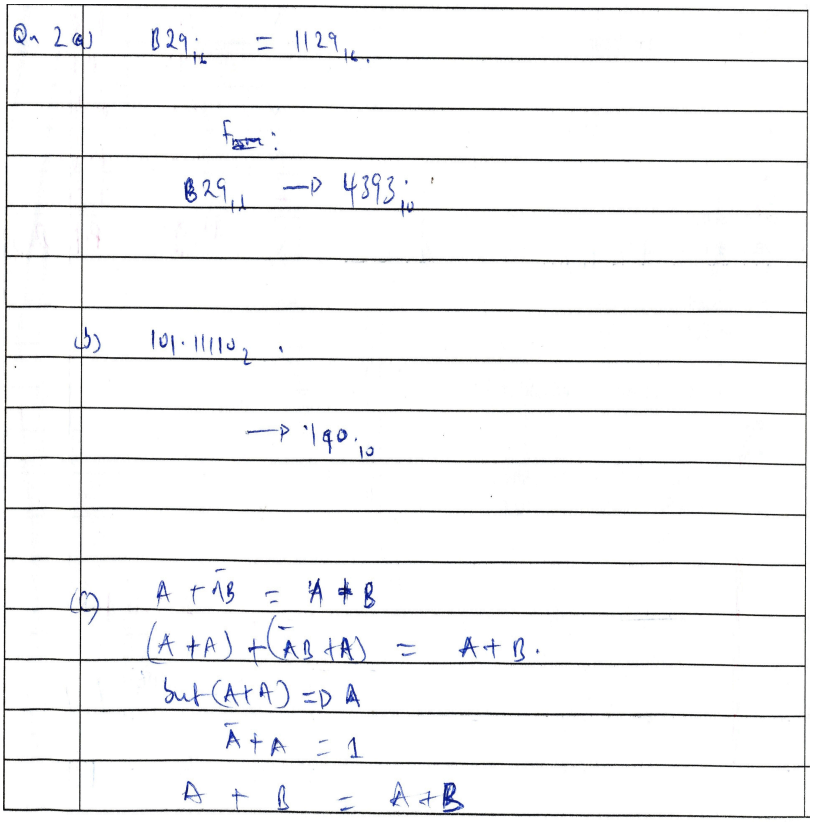




Extract 2.1 is a sample answer from a candidate who was able to convert hexadecimal and binary numbers to decimal numbers. Also he/she managed to use Boolean laws of algebra to prove Boolean expression.

The candidates who scored low marks failed to add binary numbers, identify the fractional part and integral part as well as to use Boolean laws of algebra. On other hand, 2.1 percent of the candidates failed to score any mark due to lack of knowledge on data presentation. One of the candidates used "absorption law" as the first stage of solving the question which is not correct because there was no relation to that law. Extract 2.1 represents a sample of a poor solution provided by a candidate.

Extract 2.1



Extract 2.1 represents a sample of poor answer from a candidate who failed to convert both hexadecimal and binary numbers to decimal numbers and ended in guessing the answers. The response provided in part (c) indicates that the candidate had poor knowledge on Boolean laws of algebra.

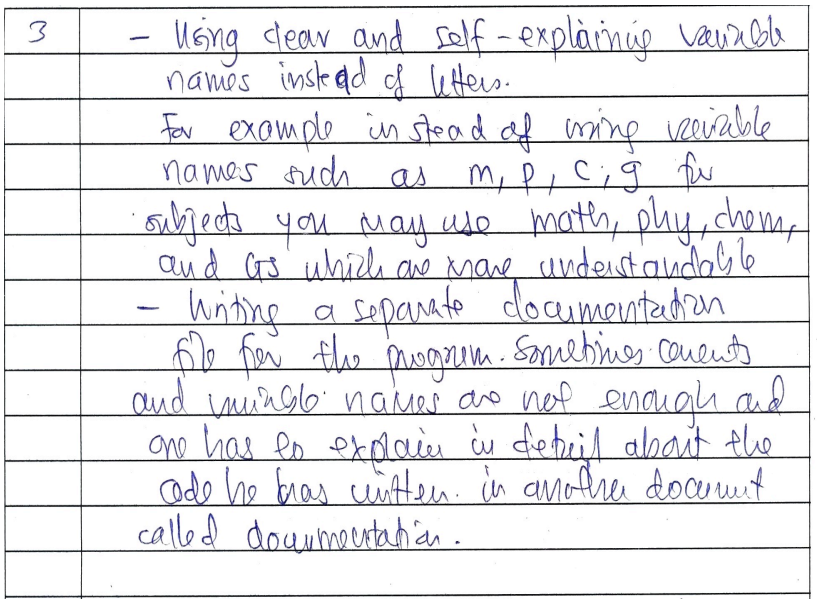
2.1.3 Question 3: C++ Programming

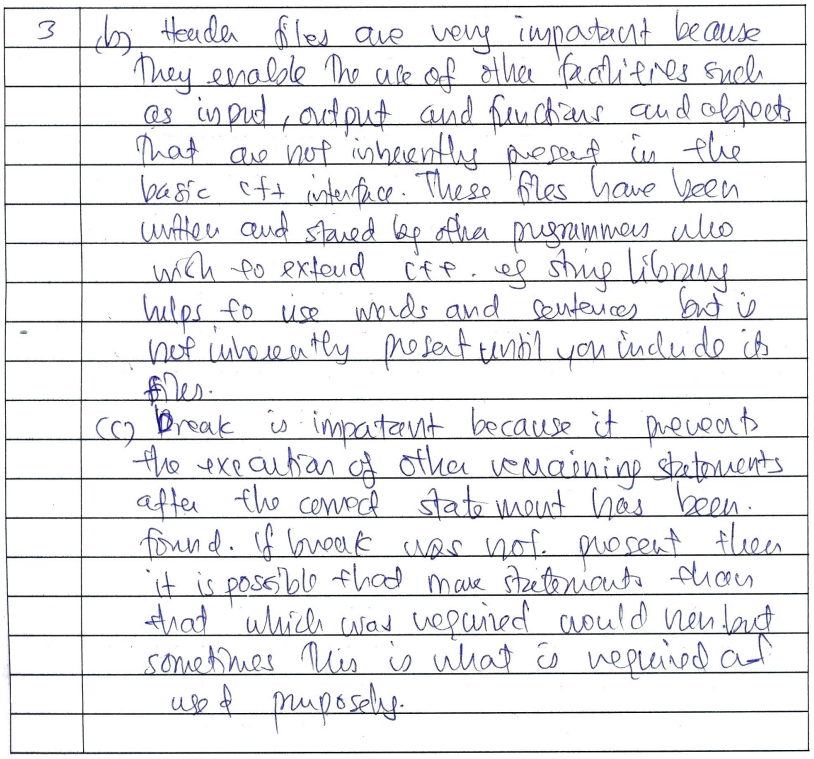
This question had three parts (a), (b) and (c). In part (a) candidates were required to describe three methods that a programmer can use to make C++ code understood to allow the computer engineer to maintain it. Part (b) required them to explain why header file(s) are very important in every C++ program and in part (c) they were required to explain the importance of **break** at the end of each switch…case statement.

A total of 92 candidates (96.8%) attempted this question out of which 2.2 percent scored a zero mark, 61.9 percent scored from 0.5 to 2.5 marks and 35.9 percent scored from 3 to 5 out of 6 marks; but there was no any candidate who scored full marks. However, the general performance for this question was good.

The candidates who scored high marks were able to provide the correct response on the methods used by a programmer to make C++ code understandable and the importance of break at the end of each switch… case statement. The failure was observed on the explanation of the importance of header file(s) in C++ program. This indicates that candidates lacked the knowledge to some parts of a C++ program format. Extract 3.1 is a sample of a good response provided by a candidate.

Extract 3.1




3 (b) Header files are very important because they enable the use of other facilities such as input, output and functions and objects that are not inherently present in the basic c++ interface. These files have been written and stored by other programmers who wish to extend c++. eg string library helps to use words and sentences but is not inherently present until you include its files.

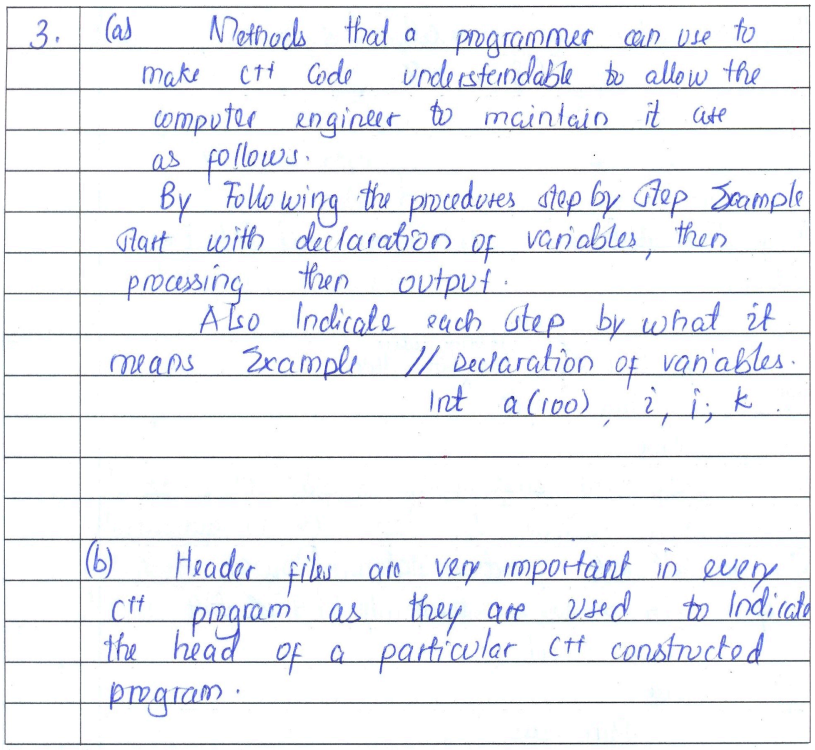
(c) Break is important because it prevents the execution of other remaining statements after the correct statement has been found. If break was not present there it is possible that more statements than that which was required would run but sometimes this is what is required at use & purposely.

Extract 3.1 shows a sample of a script from a candidate who understood the requirement of the question but failed to describe correctly three methods used by a programmer to make C++ code understood.

The candidates who responded poorly to this question failed to meet the requirement of the question in part (a) which required them to describe three methods that a programmer can use to make C++ code understandable and the importance of header file(s) in C++ program. They also failed to explain the importance of break at the end of each switch… case statement. For example some of the candidates wrote *interpreter*, *assembler* and *compiler* as methods that a programmer can use to make C++ code understood, instead of sensible variables, comments, and indentions. This indicates that some candidates had poor knowledge on C++ codes and

control structure. Extract 3.2 is a sample of poor solution provided by one of the candidates.

Extract 3.2


3. (a) Methods that a programmer can use to make C++ code understandable to allow the computer engineer to maintain it are as follows.
By Following the procedures step by Step Example Start with declaration of variables, then processing then output.
Also Indicate each Step by what it means Example // Declaration of variables.
Int a(100), i, j; k.

(b) Header files are very important in every C++ program as they are used to Indicate the head of a particular C++ constructed program.

Extract 3.2 shows a sample of a response of a candidate who failed to provide a correct answers. The candidate had an idea on comments that a programmer can use but failed to organise the idea.

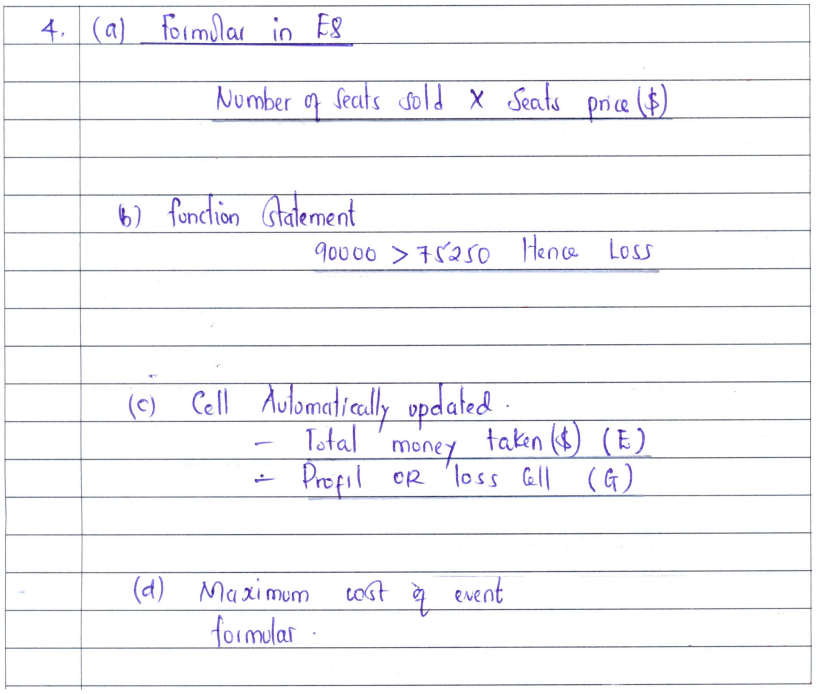
2.1.4 Question 4: Computer Basics

In this question, candidates were required to study the given monthly records on a spreadsheet of organised rock music events which contained seven columns and nine rows, then were asked to; (a) provide the formula in cell E8 which used to work out the total money taken for "The manual" event (b) write function statement which was in cell G4 (c) identify the cells which would be automatically updated if the value in C7 was changed to 2000 and (d) Write the formula to find maximum cost of event.

A total of 86 candidates (90.5%) attempted this question and had an average performance because 8.1 percent scored a zero mark, 64 percent scored from 0.5 to 2.5 marks and 26.7 percent scored from 3 to 5.5 out of 6 marks. However, only one candidate (1.2 %) scored full marks.

The candidates who performed poorly in this question failed to provide correct formula by writing formula without equal sign ("=") and used "x" instead of "*" as multiplication sign. They also failed to write the correct function to provide profit and loss in cell G4. Some of the candidates used C++ programming language to answer the question instead of the spreadsheet. This indicates that these candidates had poor knowledge on the spreadsheet and so failed to meet the requirement of the question. Extract 4.1 represents a sample of poor solution which was provided by a candidate.

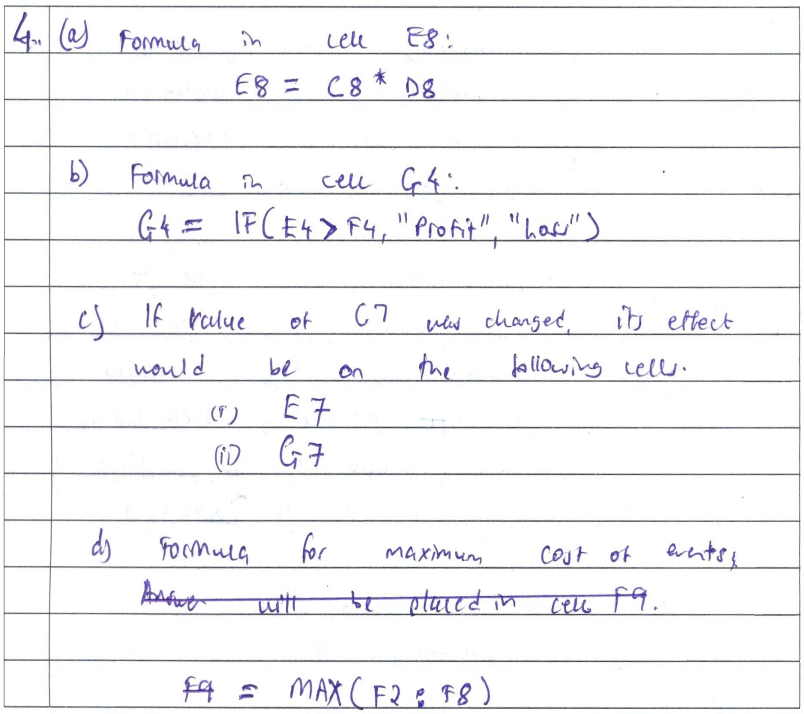
Extract 4.1



Extract 4.1 shows a sample answer of a candidate who ended up writing incorrect formula by using "x" instead of "*" sign in part (a), either he/she failed to give correct answers to the rest parts of the question.

One candidate (1.2%) who performed well managed to write the correct formula for multiplication using "*" symbol and the formula to find maximum cost, an indication that the candidate had adequate knowledge on spreadsheets. Extract 4.2 is a good response which was provided by this candidate.

Extract 4.2



Extract 4.2 shows a sample answer of a candidate who presented the correct spreadsheet formula, cells and functions.

2.1.5 Question 5: Information Systems

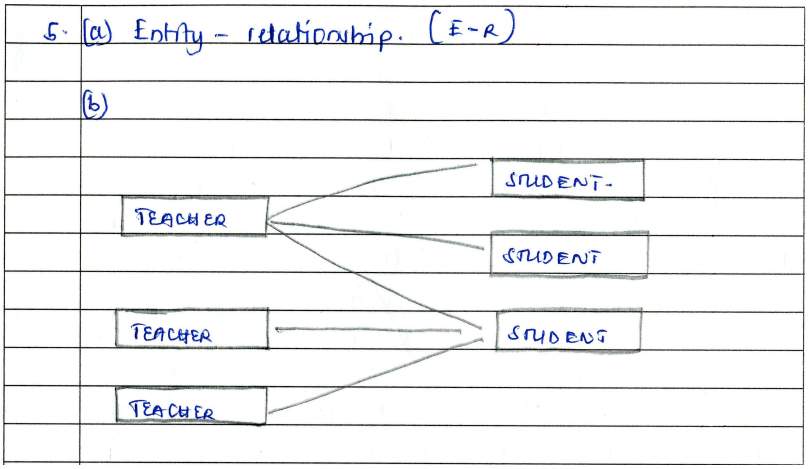
In this question, candidates were required to consider a school database which consisted of a table of student's details and that of a teacher's and they were required to; (a) state the type of relationship between the two tables (b) draw the normalized relationship between the student's details and teacher's details

in the form of entity-relationship diagram and (c) explain the meaning of primary and foreign keys by giving examples using the given tables.

A total of 91 candidates (95.8%) attempted this question out of which 22.0 percent scored a zero mark, 51.6 percent scored from 0.5 to 2.5 marks and 25.3 percent scored from 3 to 5.5 out of 6 marks. However, one candidate (1.1%) scored full marks. This trend indicates that the general performance for this question was average.

The candidates who scored a zero mark had problems with part (a) and (b) which involved to state the relationship between the given tables and to draw the normalized relationship between the students' details and teachers' details in the form of entity-relationship. Candidates wrote one to many instead of many to many relationships. They also failed to draw the correct entity relationship diagram because they applied a table on their drawings instead of using the required entities. These difficulties led some of them completely fail to attempt part (c). Extract 5.1 provides a sample of a poor response which was provided by a candidate.

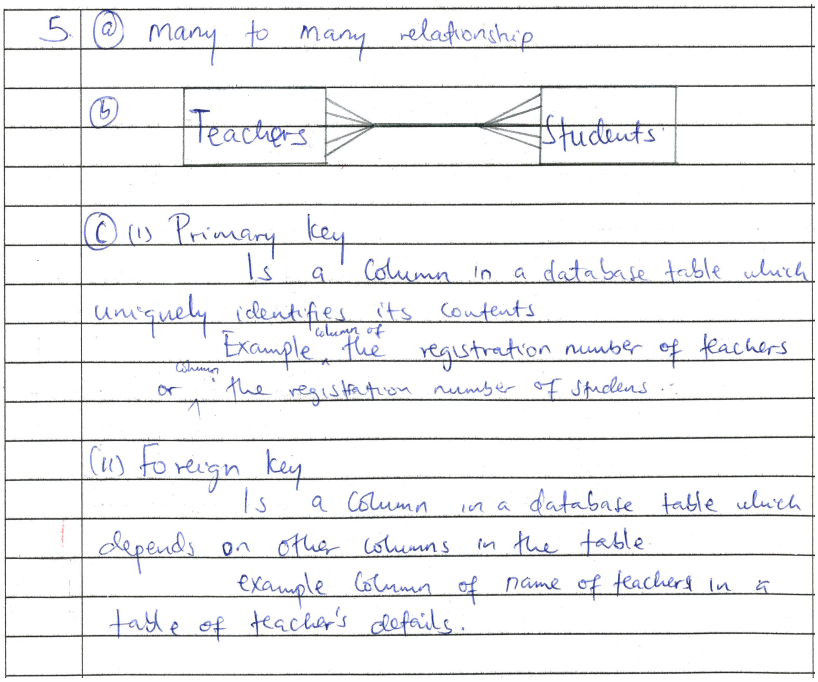
Extract 5.1



Extract 5.1 shows a response of a candidate who failed to provide the relationship between two tables and was unable to draw the correct normalized relationship.

On the other hand, candidates who scored low marks were able to provide the correct meaning of the term primary and foreign keys but failed to correlate their examples with the given entities. Some of the candidates managed to draw the correct entities but could not write the correct relationship. Few candidates were able to provide the correct response as the question required. Extract 5.2 represents a sample of a good response.

Extract 5.2



In extract 5.2, the candidate understood the question requirement and managed to give the correct type of relationship between two tables and was able to draw the normalized relationship as well as the definition of primary and foreign keys.

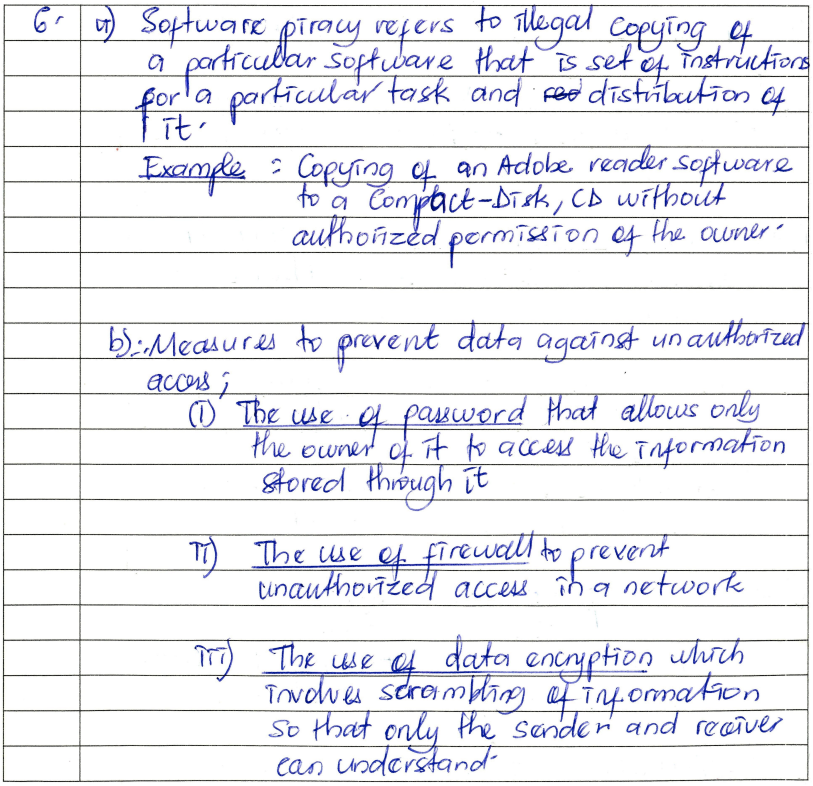
2.1.6 Question 6: Computer Security and Privacy

This question had two parts, (a) and (b). In part (a) candidates were required to explain the concept of software piracy by giving example. Part (b) required them to describe three measures taken to prevent data against unauthorized access.

A total of 95 candidates (100%) attempted this question out of which 1.1 percent scored a zero mark, 18.9 percent scored from 1 to 2.5 marks and 67.4 percent scored from 3 to 5.5 out of 6 marks. On the other hand 12.6 percent scored full marks, indicating that the general performance for this question was good.

Candidates who scored high marks were able to explain the concept of software piracy correctly. They also managed to describe three measures taken to prevent data against access to unauthorized persons. Responses such as installation of firewall, use of passwords and physical protection were given by candidates. Extract 6.1 shows a sample of a good response from one of the candidates.

Extract 6.1


6. a) Software piracy refers to illegal copying of a particular software that is set of instructions for a particular task and ~~red~~ distribution of it.

Example : Copying of an Adobe reader software to a Compact-Disk, CD without authorized permission of the owner.

b) :. Measures to prevent data against unauthorized access ;

(I) The use of password that allows only the owner of it to access the information stored through it

II) The use of firewall to prevent unauthorized access in a network

III) The use of data encryption which involves scrambling of information so that only the sender and receiver can understand

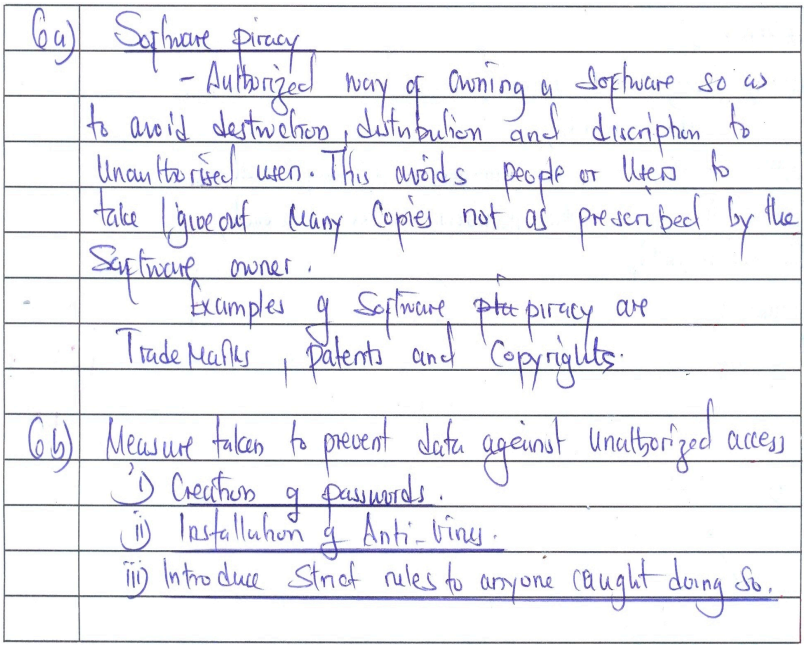
Extract 6.1 is a sample from a candidate who had a clear understanding on the question requirement and managed to give the correct measures to prevent data against unauthorized access.

On contrary, the candidates who scored poorly in this question were unable to explain the concept of software piracy. They ended up by explaining the term piracy by citing their arguments on other fields such as entertainment (especially

music and movies) and leaving the main concept of the question which was about software piracy.

The analysis further indicates that, some candidates failed to distinguish between prevention of unauthorized access to data from prevention of data loss. These candidates explained measures to be taken to prevent data loss, for example, one candidate wrote *antivirus* which was incorrect because antivirus helps to prevent data from being lost and not to prevent data from unauthorized access. Extract 6.2 is a sample of a poor response provided by a candidate.

Extract 6.2


6 a) Software piracy
- Authorized way of owning a software so as to avoid destruction, distribution and discription to Unauthorised users. This avoids people or Users to take / give out Many Copies not as prescribed by the Software owner.
Examples of Software ~~the~~ piracy are Trade Marks, patents and Copyrights.

6 b) Measure taken to prevent data against Unauthorized access
i) Creations of passwords.
ii) Installation of Anti-Virus.
iii) Introduce Strict rules to anyone caught doing so.

Extract 6.2 is a sample of poor response from a candidate who failed to provide the correct answers. Although had an idea of software piracy in part (a) he/she failed to explain it correctly and also gave examples which were wrong. In part (b), the candidate failed to distinguish between measures to prevent data against unauthorized access and data loss.

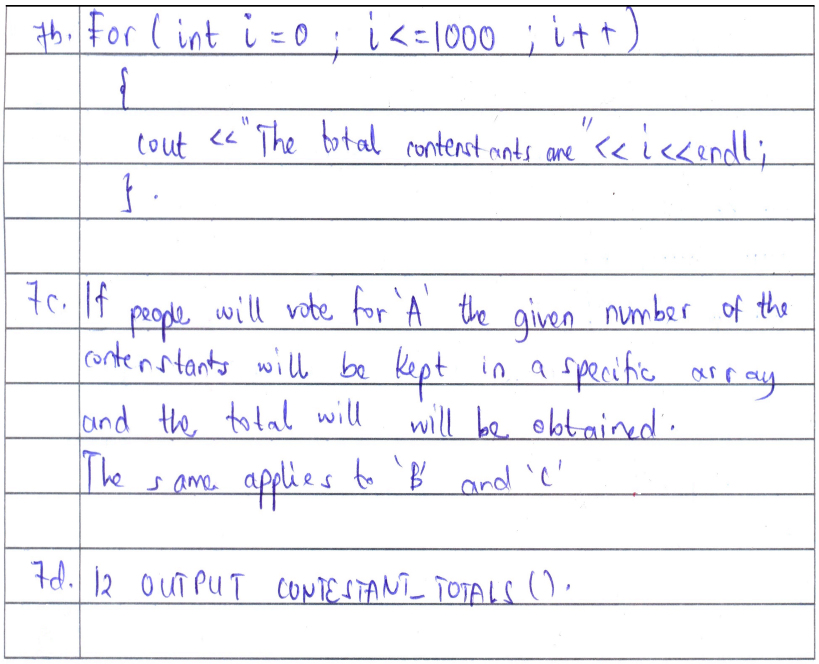
2.1.7 Question 7: Visual Programming

In this question the candidates were required to consider an algorithm of election of a new mayor where people in the town can vote for whoever they prefer from three contestants A, B and C. The voting was done by each voter pressing one set of buttons labeled A, B and C in the voting booth. The candidates had to; (a) explain why it will be necessary to initialize the array CONTESTANT_TOTALS () before to run the algorithm, (b) write a FOR loop which can be used to initialize the array CONTESTANT_TOTALS () at the beginning of the algorithm, (c) explain what happens when the program based on this algorithm is executed and (d) re-write line 12 to produce the correct result.

A total of 81 candidates (85.3%) attempted this question and it had a poor performance because 50.6 percent of the candidates scored a zero mark, 39.5 percent scored from 0.5 to 2.5 marks and 9.9 percent scored from 3 to 5.5 out of 6 marks whereas no candidate scored a full mark.

Many candidates (50.6%) failed to score any mark because they failed to identify the type of programming language used in the given algorithm given. The algorithm presented in the question was written by using visual programming but the candidates used the C++ programming concept to answer the question which made them to score poorly. Extract 7.1 represents a typical case.

Extract 7.1



Extract 7.1 is a sample of poor response from a candidate who failed to identify the type of programming language used. The candidate used C++ program concept instead of visual programming.

Few candidates (9.9%) gave the correct response to the question by providing the correct program of visual basic which includes proper syntax of a For loop (iteration control) but they failed to give the correct output of the algorithm. Extract 7.2 represents a good response which was provided by a candidate.

Extract 7.2

7. (a) It is necessary to initialise the array to zero because if not initialised the compiler will initialise the array to whatever random values and therefore from the begining the contestant totals will already have had values.

(b) FOR j = 1 TO 3
CONTESTANT_TOTALS(j) = 0
NEXT j

7. (c) the contestant voted for is A then the Contestant total is incremented by one if B the same happens as well as C. The total incremented for A is found in CONTESTANT_TOTAL(1) while that for B is in CONTESTANT_TOTAL (2) and that for C is in CONTESTANT_TOTAL (3).
At the end of the loop the program prints out the results.

(d) 12 PRINT "The total votes for contestant A is " + CONTESTANT_TOTAL (1)
13 PRINT "The total votes for contestant B is" + CONTESTANT_TOTAL (2)
14 PRINT "The total votes for contestant C is" + CONTESTANT_TOTAL (3)

Extract 7.2 provides a sample of a response by a candidate who had knowledge on visual programming but failed to give the final output in part (c) which was 0, 0, 0.

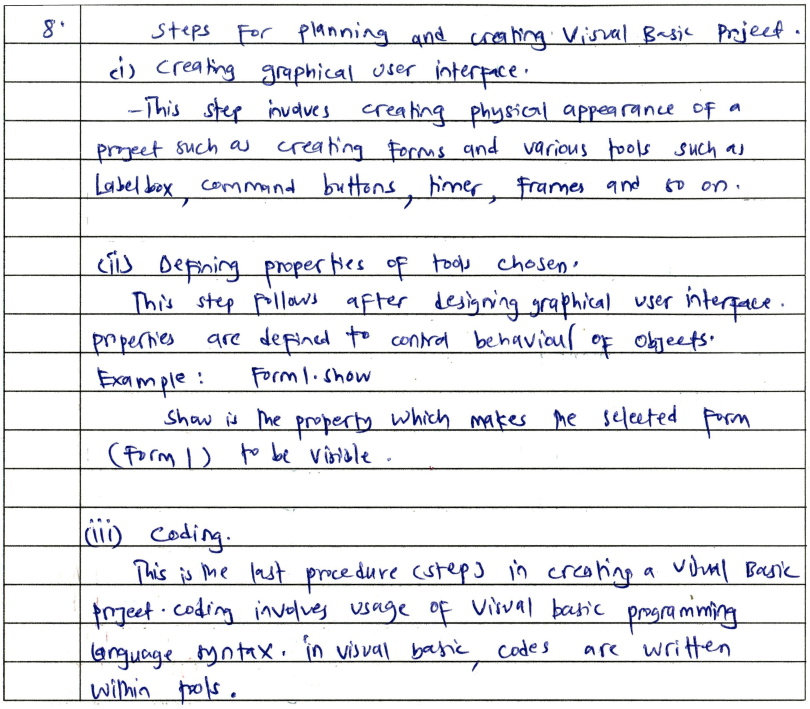
2.1.8 Question 8: Visual Programming

The question required the candidates to describe three steps for planning and creating Visual Basic project.

A total of 82 candidates (86.3%) attempted this question out of which 6.1 percent scored a zero mark, 36.6 percent scored from 0.5 to 2.5 marks, 31.7 percent scored from 3 to 5.5 out of 6 marks and 25.6 percent scored a full mark. Thus, the general performance of the question was good.

The candidates who scored high marks were able to describe three steps for planning and creating Visual Basic project correctly. The responses such as *creating interface, setting properties of controls and creating of codes* are the steps which were stated by these candidates. Extract 8.1 shows a sample of a good response.

Extract 8.1

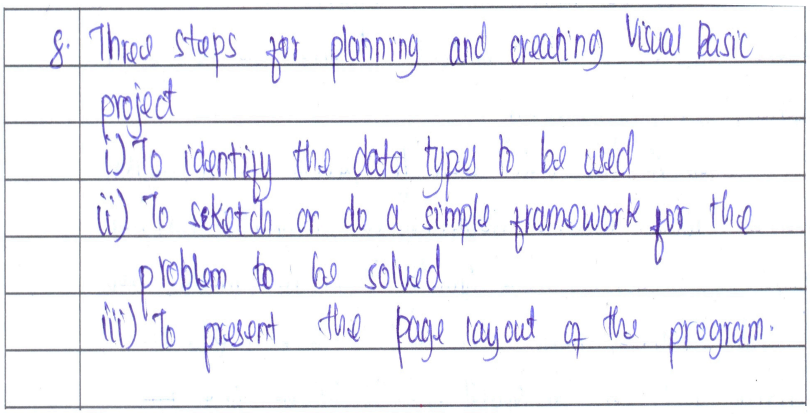

8. Steps for planning and creating Visual Basic Project.
(i) Creating graphical user interface.
-This step involves creating physical appearance of a project such as creating forms and various tools such as Label box, command buttons, timer, frames and so on.
(ii) Defining properties of tools chosen.
This step follows after designing graphical user interface. properties are defined to control behaviour of objects.
Example: Form1.show
Show is the property which makes the selected form (form1) to be visible.
(iii) Coding.
This is the last procedure (steps) in creating a Visual Basic project. coding involves usage of Visual basic programming language syntax. in visual basic, codes are written within tools.

In extract 8.1, the candidate had understood the question requirement and managed to provide correct steps on creating Visual Basic project.

Few candidates who performed poorly in this question failed to understand the requirements of the question, for example one candidate wrote the *steps used in developing software* or *program* instead of creating Visual Basic project.

On other hand, some candidates had the concept of steps required but they failed to write them in a systematic order. Extract 8.2 provides a sample of a poor response.

Extract 8.2


8. Three steps for planning and creating Visual Basic project
i) To identify the data types to be used
ii) To sekotch or do a simple framework for the problem to be solved
iii) To present the page layout of the program.

Extract 8.2 shows a sample of solution from a candidate who failed to understand the requirement of the question and wrote the steps which are not related to the development of Visual Basic project.

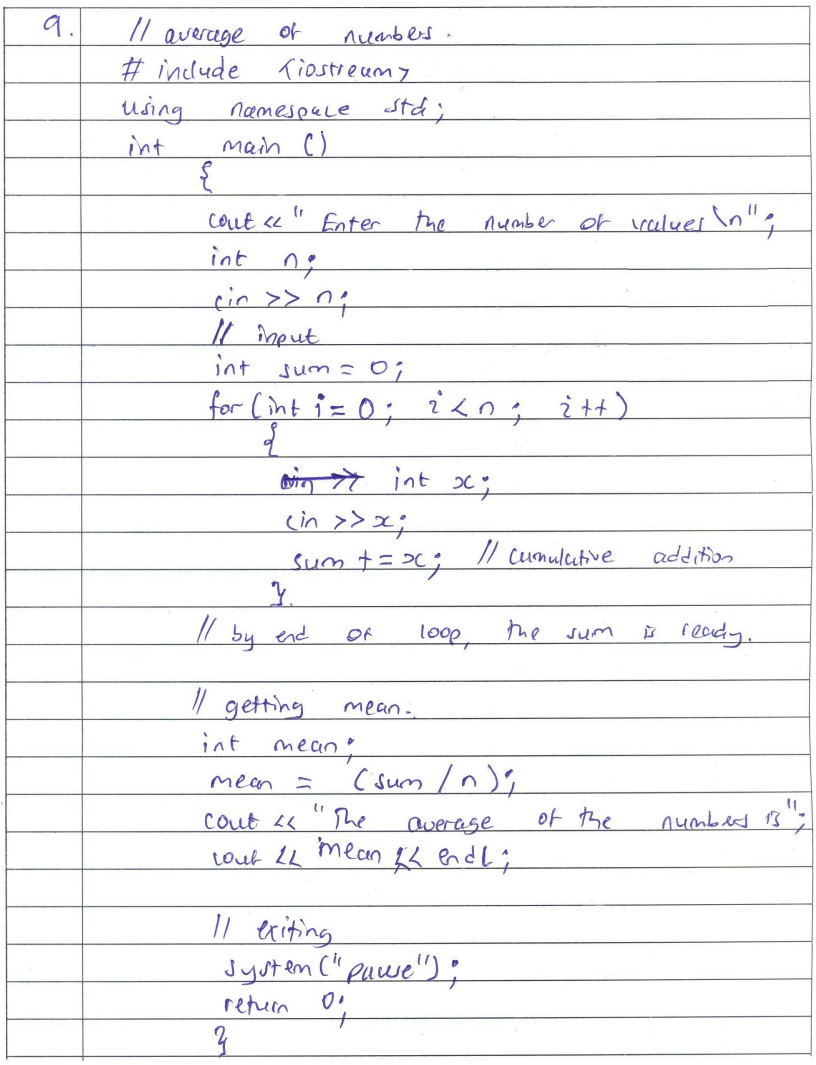
2.1.9 Question 9: C++ Programming

In this question, candidates were required to write a C++ program that reads numbers entered by a user and a program should be able to find their sum and print the average of the numbers.

A total of 94 candidates (98.9%) attempted this question, out of which 46.8 percent scored from 1 to 2.5 marks and 53.2 percent scored from 3 to 5 out of 6 marks. These data conclude that the general performance of this question was good.

The candidates who scored high marks were able to use loop concept to write the program but they failed to identify that the program itself was supposed to have a control structure which enables a user to enter numbers. Extract 9.1 provides a sample of a good response which was provided by a candidate.

Extract 9.1

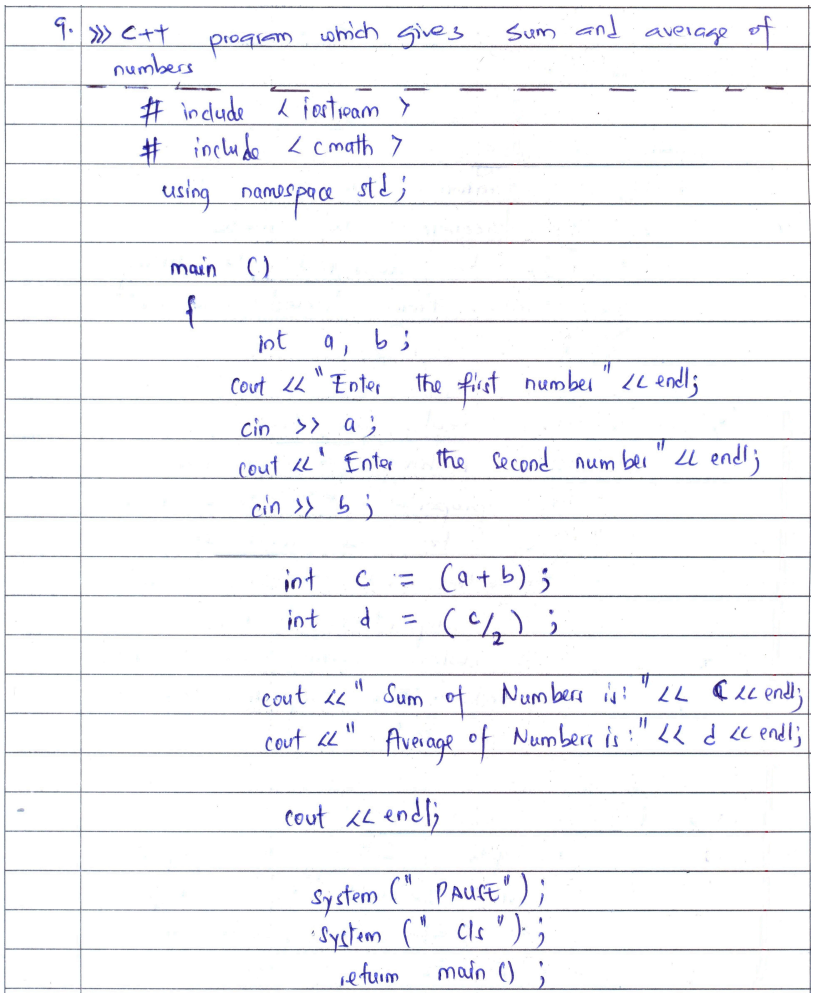


```
9.  // average of numbers.
    #include <iostream>
    using namespace std;
    int main()
    {
    cout << "Enter the number of values\n";
    int n;
    cin >> n;
    // input
    int sum = 0;
    for(int i = 0; i < n; i++)
    {
    int x;
    cin >> x;
    sum += x; // cumulative addition
    }
    // by end of loop, the sum is ready.

    // getting mean.
    int mean;
    mean = (sum / n);
    cout << "The average of the numbers is";
    cout << mean << endl;

    // exiting
    system("pause");
    return 0;
    }
```

Extract 9.1 is a sample response from a candidate who had a clear understanding on the requirement of the question but failed to write the statement which enables the user to enter numbers.

It was observed that, 46.8% of the candidates scored from 1 to 2.5 marks out of 6 marks due to various reasons such as failure to understand the requirement of the question and poor knowledge on the use of control structure. Some of the candidates wrote the program which limits a user to enter only two numbers instead of any number desired by the user. Extract 9.2 represents a sample of a poor response.

Extract 9.2



```
9. >>> C++ program which gives Sum and average of
   numbers
   # include < iostream >
   # include < cmath >
   using namespace std;

   main ()
   {
       int a, b;
      cout << " Enter the first number " << endl;
      cin >> a;
      cout << " Enter the second number " << endl;
      cin >> b;

       int c = (a+b);
       int d = (c/2);

      cout << " Sum of Numbers is: " << c << endl;
      cout << " Average of Numbers is: " << d << endl;

      cout << endl;

       system (" PAUSE ");
       system (" CLS ");
       return main ();
```

Extract 9.2 shows a sample of a script from a candidate who wrote a C++ program which accepts only two numbers from a user instead of any number desired by the user.

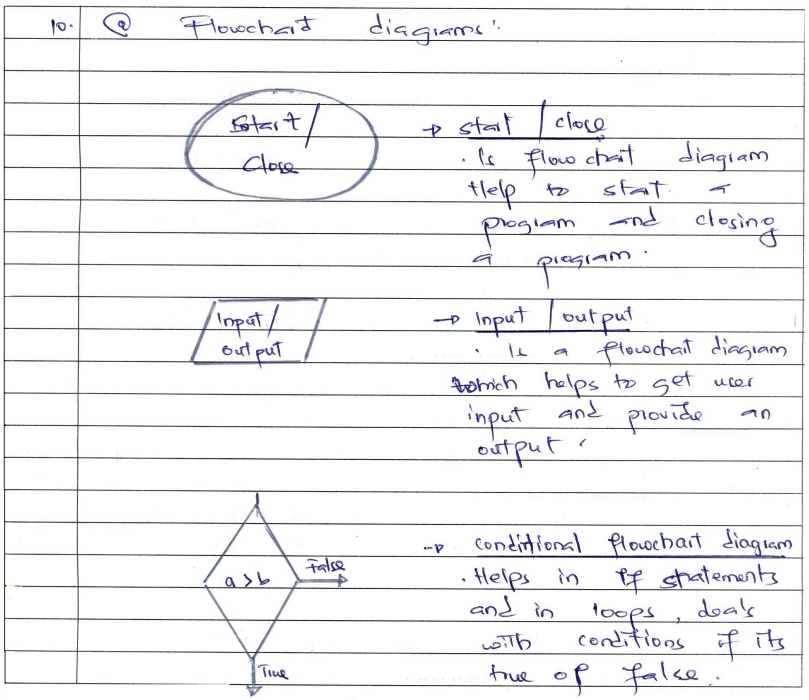
2.1.10 Question 10: Problem Solving

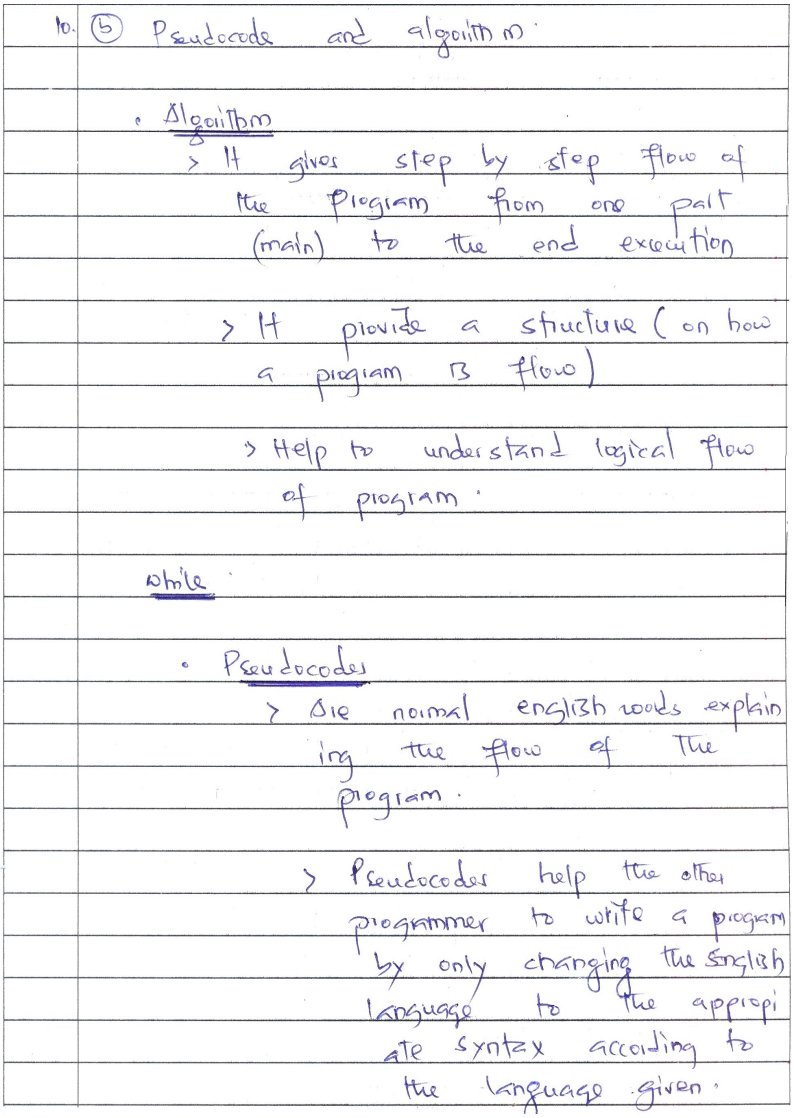
In this question, the candidates were required to (a) describe four symbols used in a flowchart diagram and (b) differentiate pseudocode from algorithm.

A total of 95 candidates (100%) attempted this question, out of these 63.2 percent scored from 3 to 5.5 out of 6 marks and 36.8 percent scored full marks. There was no candidate who scored below 3 marks, the trend which shows that the question was well performed.

Candidates who scored good marks were able to draw correct symbols used in a flow chart diagram with their corresponding explanation. They also managed to differentiate pseudocode from algorithm. Extract 10.1 represents a sample of a good response.

Extract 10.1



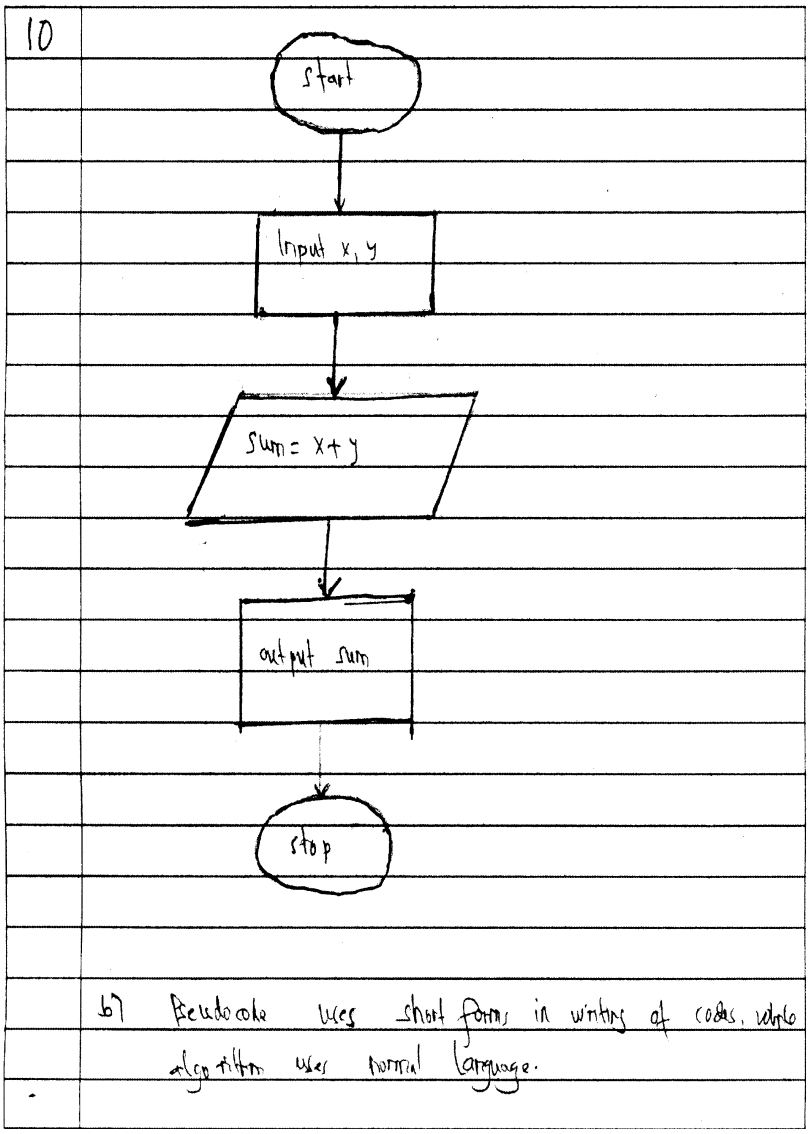


Extract 10.1 shows a sample from a candidate who was able to draw symbols used in a flow chart diagram with explanations and managed to differentiate pseudocode from algorithm.

Despite the satisfactory performance, few candidates could not score full mark due to disorganized symbols with their respective explanations. For example one candidate drew a rectangle symbol and gave explanations of parallelogram symbol and vice versa. Also some candidates lacked knowledge about pseudocode and algorithm which led to their

failure in giving a correct response. Extract 10.2 represents a sample of a poor response provided by a candidate.

Extract 10.2



Extract 10.2 shows a sample of script from a candidate who drew the flow chart which helps to find the sum of two numbers which was not the requirement of the question.

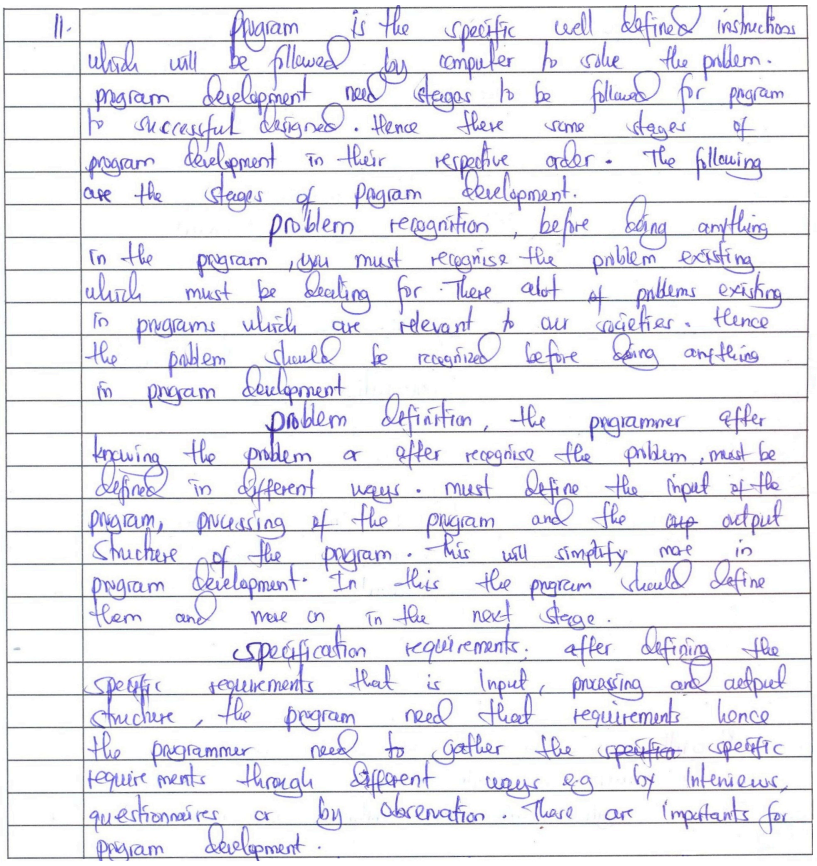
2.1.11 Question 11: System Development

This was an optional question which carried a total of twenty (20) marks. The question required the candidates to describe eight stages of program development in their respective order.

A total of 90 candidates (94.7%) attempted this question out of which 15.6 percent scored from 6 to 10.5 marks, 58.9 percent scored from 11 to 15.5 marks and 24.4 percent scored from 16 to 18 marks. No candidate scored below 6 marks and therefore this question was well performed.

Most candidates who scored high marks gave the correct response on the 8 stages of program development but they failed to give satisfactory explanations which led them to lose some marks. Extract 11.1 represents a sample of a good response provided by a candidate.

Extract 11.1

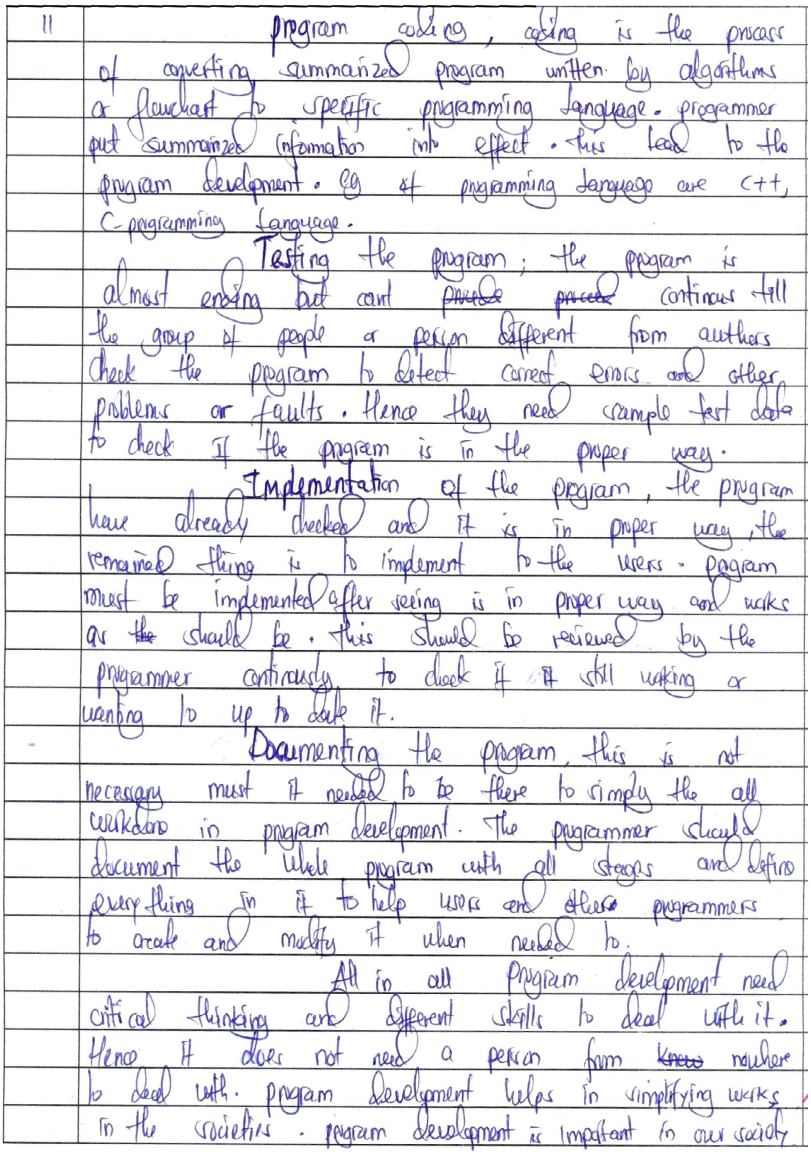


11. Program is the specific well defined instructions which will be followed by computer to solve the problem. program development need steps to be followed for program to successful designed. Hence there some steps of program development in their respective order. The following are the steps of program development.

problem recognition, before doing anything in the program, you must recognise the problem existing which must be dealing for. There alot of problems existing in programs which are relevant to our societies. Hence the problem should be recognized before doing anything in program development

problem definition, the programmer after knowing the problem or after recognise the problem, must be defined in different ways. must define the input of the program, processing of the program and the ~~out~~ output structure of the program. This will simplify more in program development. In this the program should define them and move on in the next stage.

specification requirements. after defining the specific requirements that is input, processing and output structure, the program need that requirements hence the programmer need to gather the ~~specifics~~ specific requirements through different ways e.g by interviews, questionnaires or by observation. There are importants for program development.


11

Program coding, coding is the process of converting summarized program written by algorithms or flowchart to specific programming language. programmer put summarized information into effect. this lead to the program development. Eg of programming language are C++, C-programming language.

Testing the program; the program is almost ending but cant ~~proceed~~ ~~proceed~~ continous till the group of people or person different from authors check the program to detect correct errors and other problems or faults. Hence they need sample test data to check if the program is in the proper way.

Implementation of the program, the program have already checked and it is in proper way, the remained thing is to implement to the users. program must be implemented after seeing is in proper way and works as ~~the~~ should be. this should be reviewed by the programmer continously to check if it still working or wanting to up to date it.

Documenting the program, this is not necessary must it needed to be there to simply the all workdone in program development. The programmer should document the whole program with all stages and define everything in it to help users and ~~other~~ programmers to create and modify it when needed to.

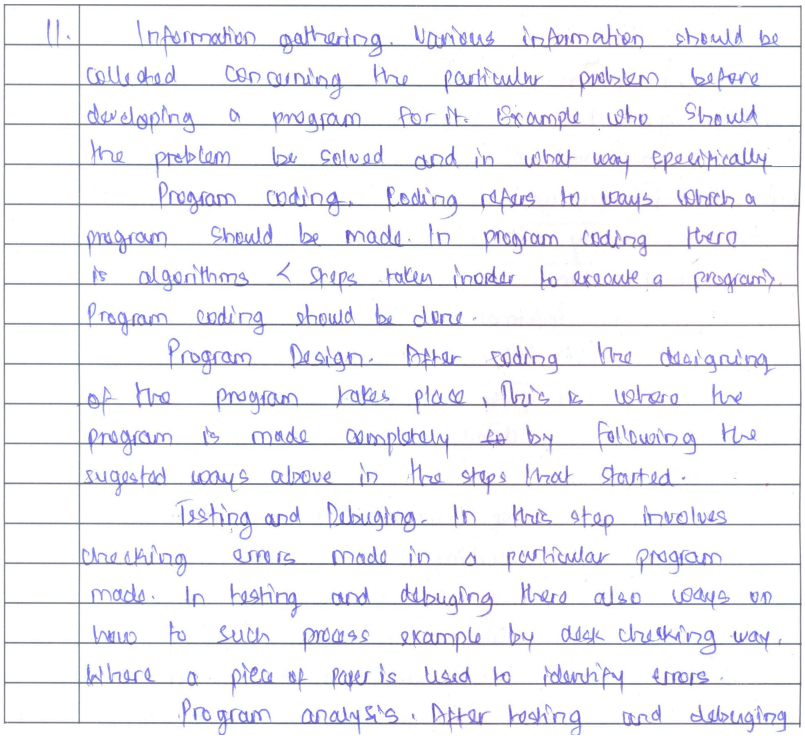
All in all program development need critical thinking are different skills to deal with it. Hence it does not need a person from ~~know~~ nowhere to deal with. program development helps in simplifying works in the societies. program development is important in our society

Extract 11.1 shows a sample of a response from a candidate who had knowledge on stages of program development and was able to explain them in their respective order but failed to give satisfactory explanation.

The candidates who scored low marks failed to arrange the stages of program development in their respective order. Moreover, they failed to provide satisfactory explanations. This indicates that the candidates lacked knowledge on the

order of the stages. Extract 11.2 represents sample of a poor response provided by a candidate.

Extract 11.2


11. Information gathering. Various information should be collected concerning the particular problem before developing a program for it. Example who should the problem be solved and in what way specifically.
Program coding. Coding refers to ways which a program should be made. In program coding there is algorithms < steps taken inorder to execute a program. Program coding should be done.
Program Design. After coding the designing of the program takes place, This is where the program is made completely ~~to~~ by following the sugested ways above in the steps that started.
Testing and Debuging. In this step involves checking errors made in a particular program made. In testing and debuging there also ways on how to such process example by desk checking way. Where a piece of paper is used to identify errors.
Program analysis. After testing and debuging

Extract 11.2 indicates a sample of answer from a candidate who failed to explain the stages of program development in their respective order.

2.1.12 Question 12: IT Environment

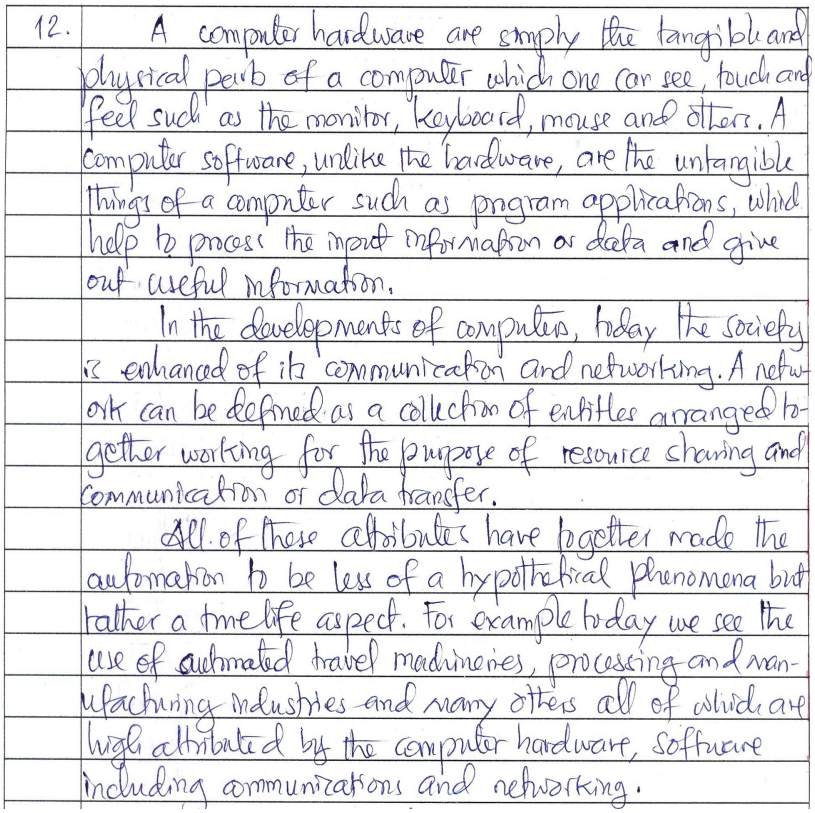
This was an optional question which carried a total of twenty (20) marks. The candidates were required to explain how the computer hardware and software including communications and networking have made automation to be possible in our daily life by referring to eight areas.

A total of 82 candidates (86.3%) attempted this question out of which 2.4 percent scored from 4 to 5.5 marks, 31.7 percent

scored from 7.5 to 11.5 marks and 65.9 percent scored from 12 to 18.5 marks a trend which signify that the general performance for this question was good.

Most of the candidates who attempted this question responded well and were able to relate three concepts of networking, software and hardware to automation process. The responses such as *Banks, Hospitals, Education and Communications* were provided by a number of candidates as areas where computer hardware and software are applied in our daily life. Extract 12.1 represents a sample of a good response provided by a candidate.

Extract 12.1


12. A computer hardware are simply the tangible and physical parts of a computer which one can see, touch and feel such as the monitor, keyboard, mouse and others. A computer software, unlike the hardware, are the untangible things of a computer such as program applications, which help to process the input information or data and give out useful information.

In the developments of computers, today the society is enhanced of its communication and networking. A network can be defined as a collection of entities arranged together working for the purpose of resource sharing and communication or data transfer.

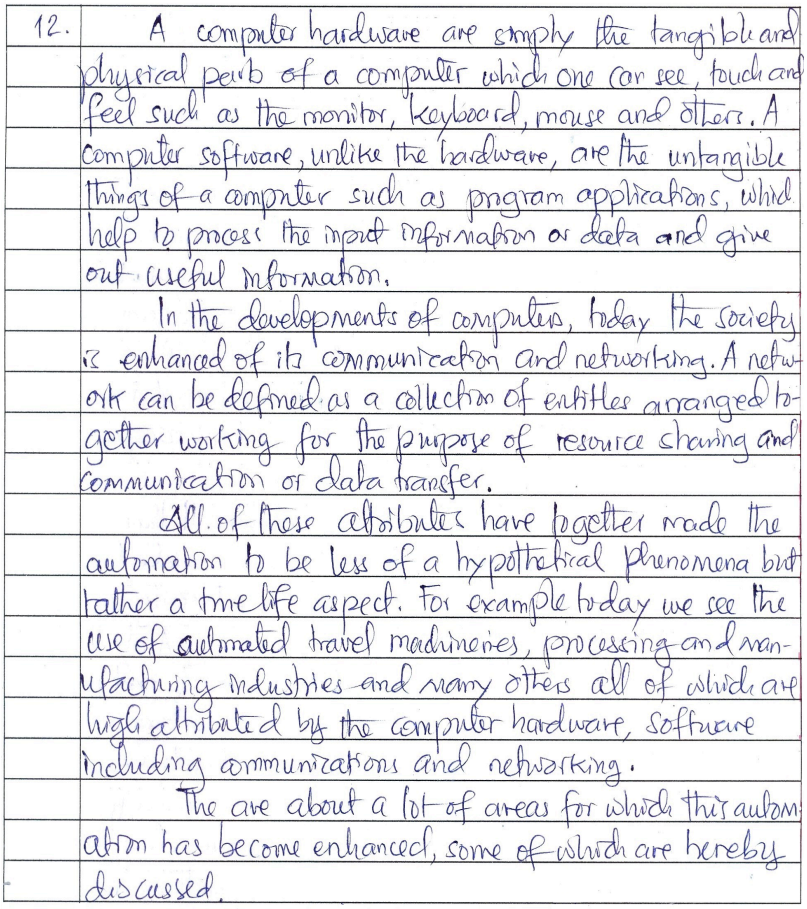
All of these attributes have together made the automation to be less of a hypothetical phenomena but rather a true life aspect. For example today we see the use of automated travel machineries, processing and manufacturing industries and many others all of which are high attributed by the computer hardware, software including communications and networking.

12. There are about a lot of areas for which this automation has become enhanced, some of which are hereby discussed.

in various hospitals which took a too lot of time. When the knowledge and development of computer hard and software including communications and networking came to existence, the ~~prog~~ problem of unnecessary registry cues was solved through automated systems and computing. Furthermore, the automation has enhanced communications among various health institutions which has brought about integrity and combating of diseases. The automation has lead to successful operations which seemed impossible in the early years, it has brought use of advanced surgery tools, electronic automated microscopes and various others.

Moreover, in the area of learning for scholars. It has brought about advancements such as computer aided applications for the learning process and the integrity is together refered to as computer aided learning. Analysis of many different aspects have become easy and through automation in communication and networking, resource sharing from places of different localities have become easy. Important materials for classes, and different lectures can now be automatically obtained.

Furthermore, in research and scientific breakthroughs. Computer hardware and software have lead to the development of tools that aid the research process. Through its automation, some great scientific breakthroughs have been made such as the robotics and biorobotics which have helped research process in nuclear and radioactive sites were a risk of physically attending the fields is high.



12. A computer hardware are simply the tangible and physical parts of a computer which one can see, touch and feel such as the monitor, keyboard, mouse and others. A computer software, unlike the hardware, are the untangible things of a computer such as program applications, which help to process the input information or data and give out useful information.

In the developments of computers, today the society is enhanced of its communication and networking. A network can be defined as a collection of entities arranged together working for the purpose of resource sharing and communication or data transfer.

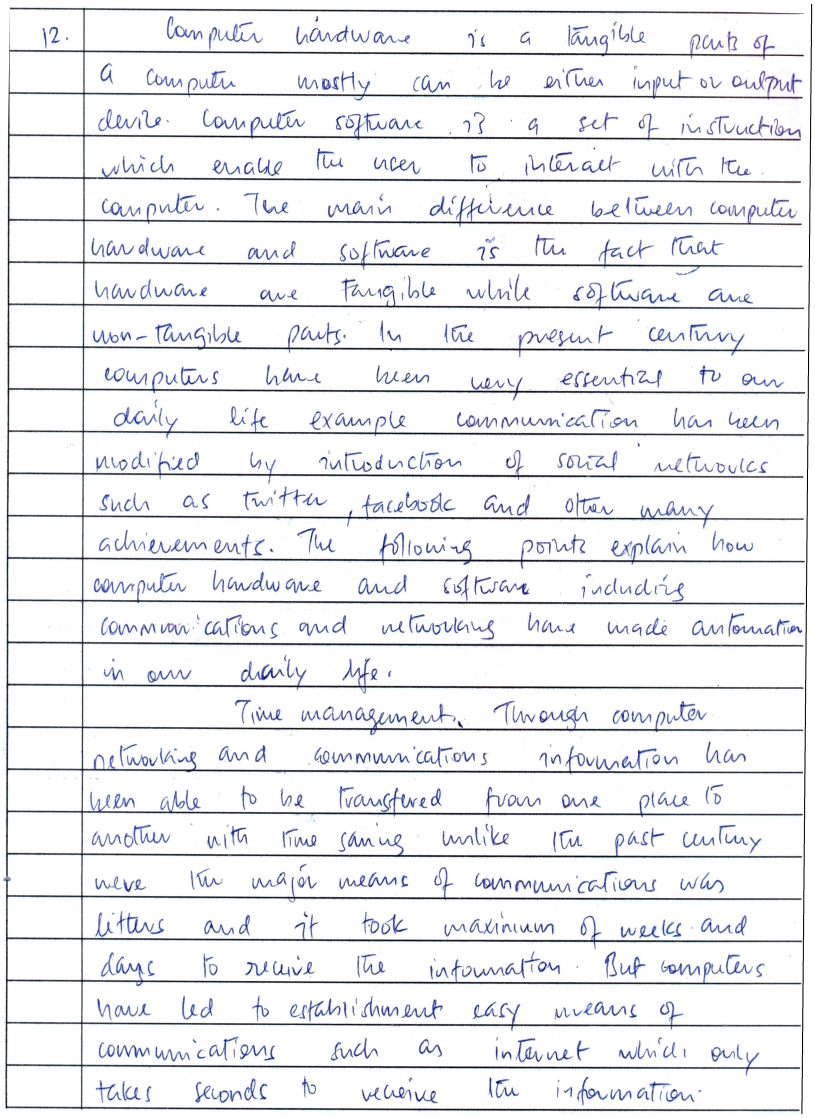
All of these attributes have together made the automation to be less of a hypothetical phenomena but rather a timelife aspect. For example today we see the use of automated travel machineries, processing and manufacturing industries and many others all of which are high attributed by the computer hardware, software including communications and networking.

The are about a lot of areas for which this automation has become enhanced, some of which are hereby discussed.

Extract 12.1 shows a sample of a response from a candidate whose explanation basically fits to the idea of hardware, software and networking in relation to automation process.

Few candidates who scored poorly failed to understand requirement of the question. Some gave the answers in short form instead of writing in essay form. Few candidates wrote the advantages of using computer instead of the use of computer hardware and software together with networking in relation to automation in various areas. Extract 12.2 represents a sample of a poor response provided by a candidate.

Extract 12.2



12. Computer hardware is a tangible parts of a computer mostly can be either input or output device. Computer software is a set of instruction which enable the user to interact with the computer. The main difference between computer hardware and software is the fact that hardware are tangible while software are non-tangible parts. In the present century computers have been very essential to our daily life example communication has been modified by introduction of social networks such as twitter, facebook and other many achievements. The following points explain how computer hardware and software including communications and networking have made automation in our daily life.

Time management. Through computer networking and communications information has been able to be transfered from one place to another with time saving unlike the past century where the major means of communications was letters and it took maximum of weeks and days to receive the information. But computers have led to establishment easy means of communications such as internet which only takes seconds to receive the information.

Extract 12.2 is a sample from a candidate who failed to organise thoughts which led him/her to explain the advantages of computer instead of application areas.

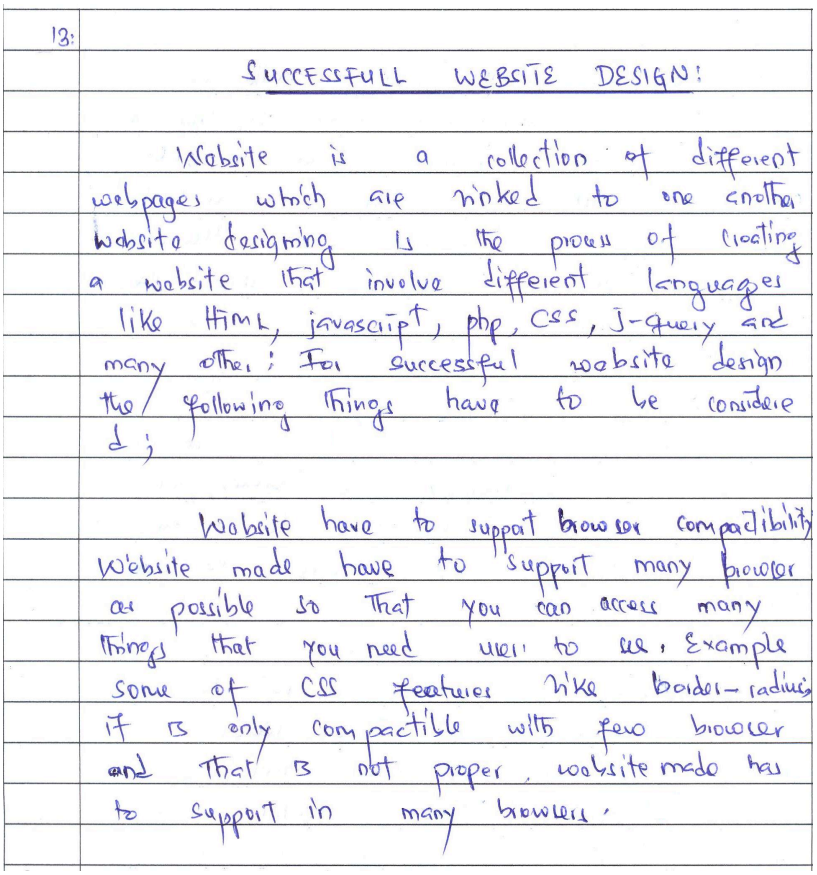
2.1.13 Question 13: Website Development

This also was an optional question which carried a total of twenty (20) marks. The question required the candidates to describe eight factors to be considered for successful Website Development.

A total of 18 candidates (18.9%) attempted this question out of which 5.6 percent scored 2.5 marks, 44.4 percent scored from 6 to 10.5 marks and 50 percent scored from 12 to 18.5 out of 20 marks. However no any candidate scored either 0 or full marks a trend which indicates the good performance.

The candidates who scored high marks were able to provide proper factors for successful Website Development but failed to score full marks due to unsatisfactory explanation in some factors. Extract 13.1 represents a sample of a good response provided by a candidate.

Extract 13.1



13:

SUCCESSFULL WEBSITE DESIGN:

Website is a collection of different webpages which are linked to one another. Website designing is the process of creating a website that involve different languages like HTML, javascript, php, CSS, J-query and many other. For successful website design the following things have to be considered;

Website have to support browser compactibility. Website made have to support many browser as possible so that you can access many things that you need user to see, Example some of CSS features like border-radius if is only compactible with few browser and that is not proper. website made has to support in many browsers.

13

Videos and pictures embedded should not overload the website, a webdesigner have to check on the picture which doesnot require much bytes since they can slow down the website and reduce user number since the site is slow. Few number of videos should be used if possible.

Website must have a good flow of data arrangment. The data in a website have to be well arrange in tables, divisions or even frames so that to make it easier for the users to read the contents.

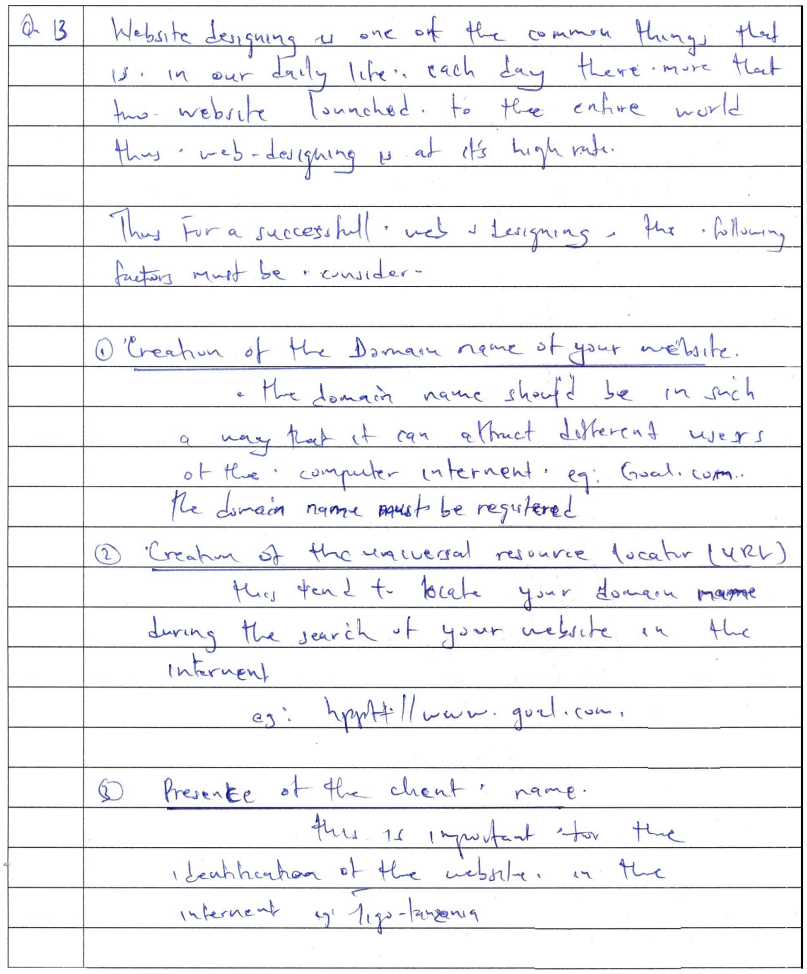
Checking on spelling errors; Webdesigner have to check out that the words used in a website doesnot have errors, This is the great problem since webdesigner are not concentrating on words written and ending up with uncorrected words with in a website.

Also; security of the website should be involved by using things like HTML entities, or Mysqlescapestring so that to avoid different inconviniences made by people who intended to break The website or to access the databases. In php make sure that you avoid SQL injection on

In extract 13.1, the candidate provided correct factors for successful Website Development but failed to give a clear explanation.

Candidates who scored low marks failed to understand the requirement of the question, and this made them to provide wrong factors for successful Website Development. For example a candidate wrote *steps in website development* as the factors for successful Website Development. This indicates that these candidates lacked clear knowledge of Website Development. Extract 13.2 represents a sample of a poor response provided by a candidate.

Extract 13.2


Q 13 Website designing is one of the common things that is in our daily life. each day there more that two website launched to the entire world thus web-designing is at its high rate.

Thus for a successfull web designing the following factors must be consider.

① Creation of the Domain name of your website.
the domain name should be in such a way that it can attract different users of the computer internet eg: Goal.com.
The domain name must be registered

② Creation of the universal resource locator (URL)
this tend to locate your domain name during the search of your website in the internet
eg: http://www.goal.com.

③ Presence of the client name.
this is important for the identification of the website in the internet eg: Yiga-tanzania

In extract 13.2, the candidate wrote steps in website development instead of the factors for successful Website Development.

2.2 Paper 2: Practical

2.2.1 Question 1: C++ Programming

This was a compulsory question which carried a total of 25 marks. Candidates were required to;

(a) Write a C++ program that prompts the user to select either Arithmetic Progression (AP) or Geometric Progression (GP) to generate and display the sum of n terms. The program should request the user to enter first term, number of terms, common ratio or common difference depending on the user's selection.

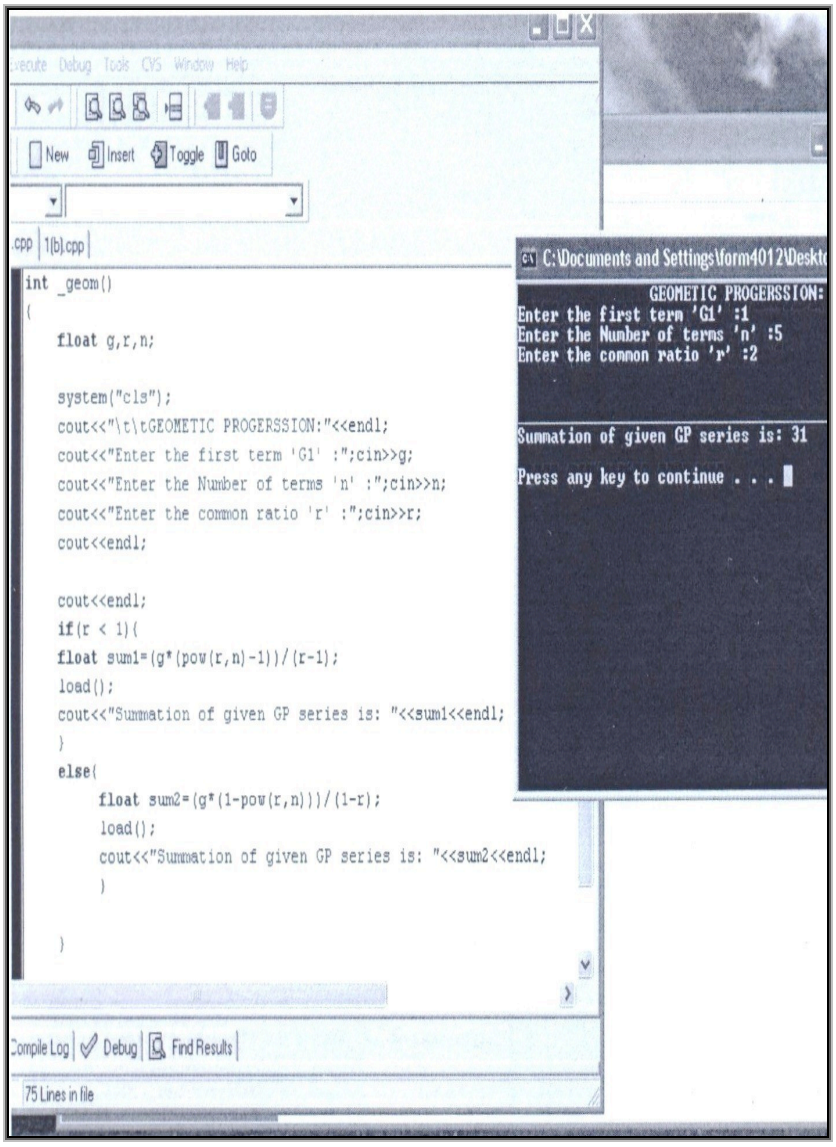
(b) Create a C++ program which prompts the user to enter 20 numbers and the program should count and print the number of zero, odd and even numbers entered.

A total of 95 candidates (100%) attempted this question out of which 6.3 percent scored from 1 to 7 marks, 27.4 percent scored from 7.5 to 12.5 marks, 13.7 percent scored from 13 to 18.5 marks, 50.5 percent scored from 19 to 24 marks and 2.1 percent of the candidates scored a full mark. Thus, according to these statistics the performance for this question was good.

Most of the candidates (50.5%) attempted this question with high scores. These candidates were able to write the programs in part (a) and (b) but some failed to score full marks in each part due to poor knowledge on the formula of finding the Geometric Progression (GP) and Arithmetic Progression (AP) which were required in part (a). They also failed in part (b) to understand that zero (0) is an even number, this made their

programs to fail to count zero as an even number. Extract 2.2.1.1 represents a sample of a good response.

Extract 2.2.1.1



```
#include<iostream>
using namespace std;

main()
{
    int i;
    int e=0,n=20,o=0,z=0;
    int a[50];


    cout<<"Enter your numbers:"<<endl;
    for(i=0;i<n;i++)
    {cin>>a[i];}
    cout<<"Numbers entered were:"<<endl;
    for(i=0;i<n;i++)
    {cout<<a[i]<<"  ";}
    cout<<endl;
    //.....................even.....................//
    cout<<">>>Even numbers are: "<<endl;
    for(i=0;i<n;i++)
    {if(a[i]%2==0)
     {cout<<a[i]<<"   ";e++;}
    }
    cout<<endl;
    cout<<"\t\tTotal of even is:"<<e<<endl<<endl;
```

Extract 2.2.1.1 shows a sample of a printout from a candidate who managed to write correct programs in part (a) and (b) as the question required.

The candidates who scored low marks failed to use the control structure such as “if condition” and “For loop” in part (a). In part (b) most candidates failed to increment the counter for even, odd and zeros. Extract 2.2.1.2 represents a sample of a poor response provided by a candidate.

Extract 2.2.1.2

```
#include<iostream>
using namespace std;
main()
{
    int i,j,x,sum,n,d,f,g,a,b;
    switch(x)
    {
    cout<<"enter your choice"<<endl;
    cin>>x;
     cout<<"arthmetic progression"<<endl;
      cout<<"arthmetic progression"<<endl;
    case(1):
    {
      sum= ((2*a) + (n-1)*d)*n/2;
      }
       break;
      case 2:
          {
              b=g*((f^n)-1)/(f-1);
          }
          break;
          }


        system("pause");
        return 0;
        }
```

```
#include<iostream>
using namespace std;
main()
{
      int i,j,n,a[100];
         int x=0;
          int y=0;
          int z=0;
      cout<<"enter 20 numbers"<<endl;
      for(i=2;i<6;i++)
      {
          cin>>a[i];
          }

          if(a[i]%2==0)
          {
              cout<<"even"<<endl;
              cout<<a[i]<<" ";
              }
              else if(a[i]%2==1)
          {
              y=y+1;
              }
               else if(a[i]==0)

          {
              z=z+1;
              } cout<<endl;
              cout<<endl;
              cout<<x<<" ";
              cout<<y<<" ";
              cout<<z<<" ";
              cout<<endl;
              system("pause");
              return 0;
              }
```

Extract 2.2.1.2 shows a sample of a printout from a candidate who failed to write the correct formula for GP and used wrong syntax in initialising the zeros, odd and even counter.

2.2.2 Question 2: Visual Programming

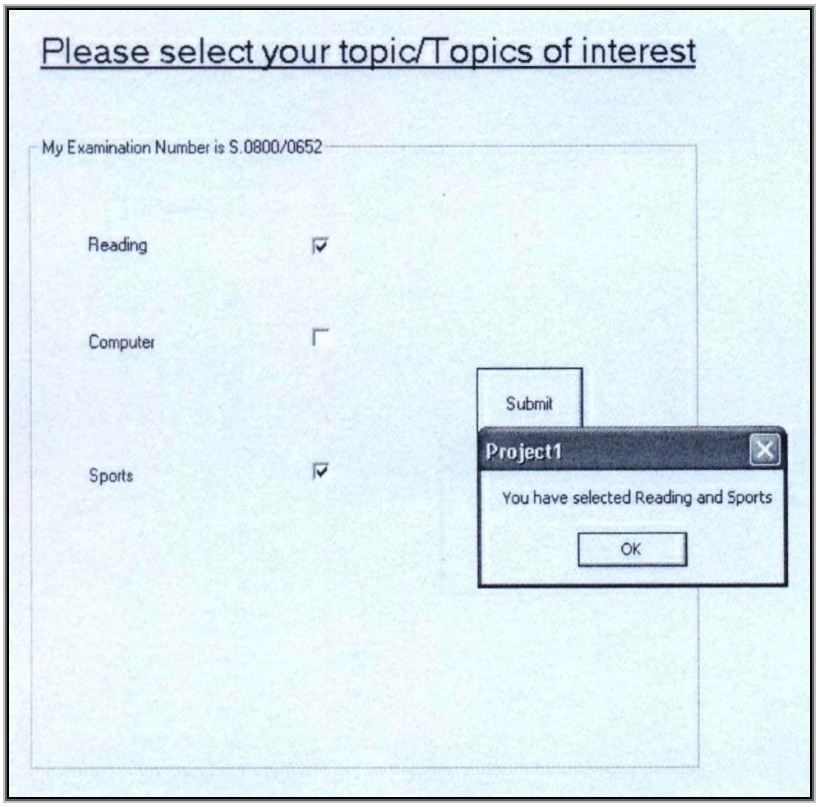
This was an optional question which carried a total of 25 marks. The candidates were required to create an interface which is used to perform a selection game. The interface was to display a message through a message box if topic/topics is/are selected and should display "YOU HAVE NO HOBBY" when no topic is selected. The second part of this question was to create a table in the database using Microsoft access, and use visual basic program to create a user interface which will display the database created as an icon.

A total of 31 candidates (32.6%) attempted this question out of which 25.8 percent scored from 3 to 7 marks, 25.8 percent scored from 7.5 to 13.5 marks, 29 percent scored from 13.5 to 18 marks while 19.4 percent scored from 19 to 24 marks which indicates a good performance for the question.

The candidates who scored high marks were able to create the interface and write codes as the question requirement in part (a). In part (b) some candidates were unable to link the database with the visual basic interface which leads to scoring of low marks. Extract 2.2.2.1 represents a sample of a good response provided by a candidate.

Extract 2.2.2.1

```
Qn 2a
Private Sub Command1_Click()
If Check1.Value = 0 And Check2.Value = 0 And Check3.Value = 0 Then
MsgBox ("You have no hobby")

ElseIf Check1.Value = 1 And Check2.Value = 0 And Check3.Value = 0 Then
MsgBox ("You have selected Reading")

ElseIf Check1.Value = 0 And Check2.Value = 1 And Check3.Value = 0 Then
MsgBox ("You have selected Computer")

ElseIf Check1.Value = 0 And Check2.Value = 0 And Check3.Value = 1 Then
MsgBox ("You have selected Sports")

ElseIf Check1.Value = 1 And Check2.Value = 1 And Check3.Value = 0 Then
MsgBox ("You have selected Reading and Computer")

ElseIf Check1.Value = 1 And Check2.Value = 0 And Check3.Value = 1 Then
MsgBox ("You have selected Reading and Sports")

ElseIf Check1.Value = 0 And Check2.Value = 1 And Check3.Value = 1 Then
MsgBox ("You have selected Computer and Sports")

ElseIf Check1.Value = 1 And Check2.Value = 1 And Check3.Value = 1 Then
MsgBox ("You have selected Reading, Computer and Sports")

End If
End Sub
```

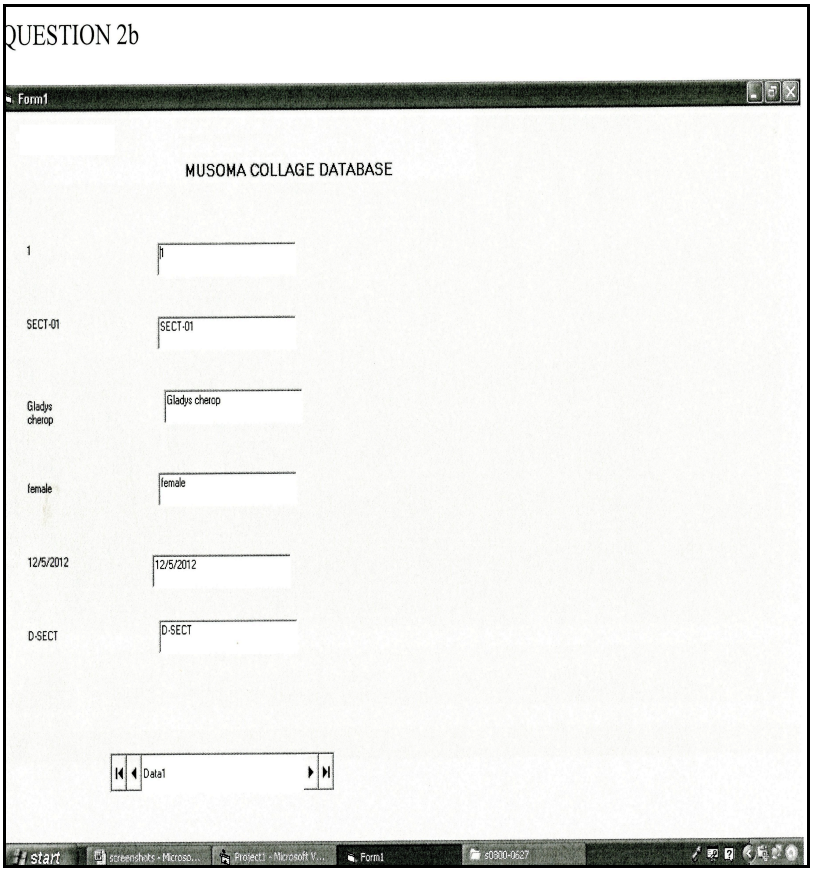


In extract 2.2.2.1, the candidate managed to create an interface with corresponding codes which functions well and performs the selection game as requirement of the question.

Candidates who scored low marks in this question were able to create a user interface in part (a) but failed to write the corresponding codes. The problem was also observed in part (b) where the candidates created a user interface with options to obtain details and then displayed the data through the data control object which was not the requirement of question. This indicates that candidates had poor knowledge on visual basic programming and they failed to understand the requirement of the question. Extract 2.2.2.2 represents a sample of a poor response provided by a candidate.

Extract 2.2.2.2

```
If Check2.Enabled = True Then
MsgBox ("YOU SELECTED COMPUTER")
End If

If Check3.Enabled = True Then
MsgBox ("YOU SELECTED SPORTS")



End If

If Check1.Enabled = False Then
MsgBox ("YOU HAVE NO HOBBY")
End If


If Check2.Enabled = False Then
MsgBox ("YOU HAVE NO HOBBY")
End If

If Check3.Enabled = False Then
MsgBox ("YOU HAVE NO HOBBY")



End If


End Sub
```



In extract 2.2.1.2, the candidate failed to provide correct codes and created the data control object instead of creating the database icon in the visual basic interface.

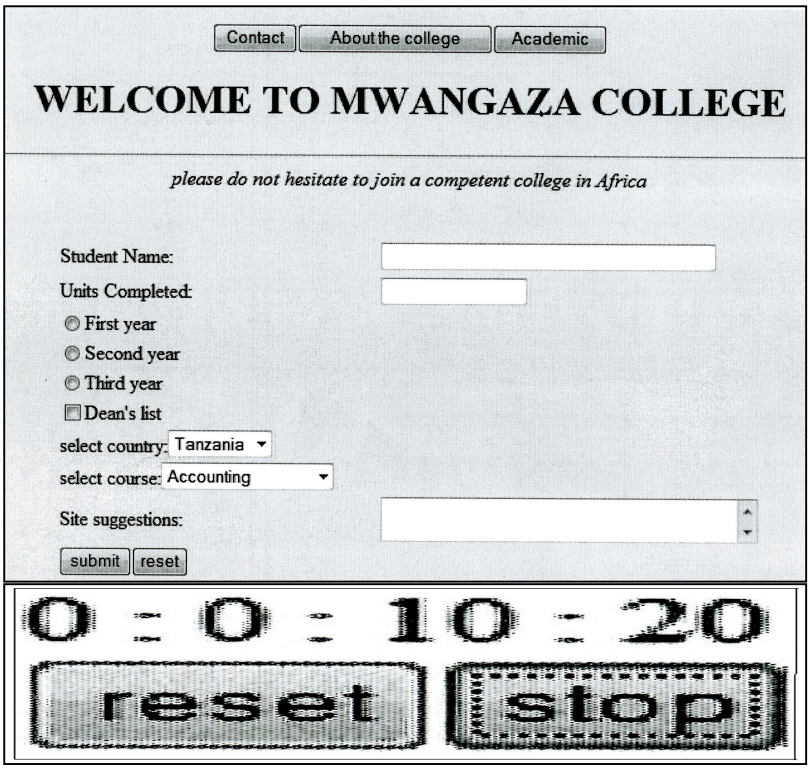
2.2.3 Question 3: Website Development

This was an optional question which carried a total of 25 marks. The question had two parts; (a) and (b). In part (a), candidates were required to use HTML codes to create a given webpage with the specified page descriptions. In part (b) candidates were required to create a simple watch by using JavaScript and HTML codes which can help the user to check for the current date and time after clicking button "Date" as shown in the given screenshot. Additionally, the user should use it as a stop watch after clicking the button "Stop watch".

A total of 64 candidates (67.4%) attempted this question out of which 3.1 percent scored from 2.5 to 6 marks, 21.9 percent scored from 7.5 to 12.5 marks, and 51.6 percent scored from 13 to 18.5 marks and 21.8 percent scored from 19 to 24.5 marks and 1.6 percent of the candidates scored a full mark. These statistics indicate that the general performance for this question was good.

The candidates who had good scores in this question were able to create the webpage with the correct layout. They also managed to create a stop watch by using JavaScript. This shows that candidates had a clear knowledge on webpage development. Extract 2.2.3.1 represents a sample of a good response which was provided by a candidate.

Extract 2.2.3.1



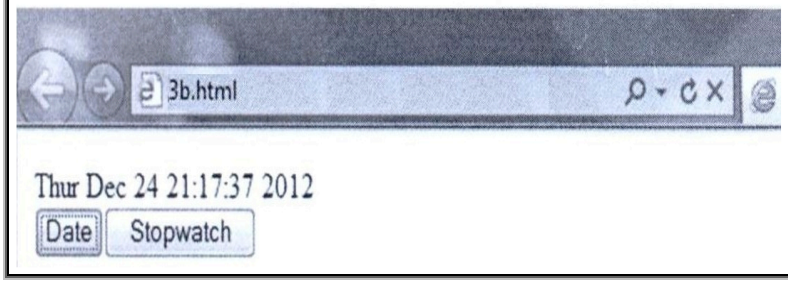
```
<html>
<head>
<title> date/stopwatch</title>
<script type="text/javascript">
function sd()
{
var x = new Date();
document.getElementById("date").innerHTML=x;
document.getElementById("date").style.display = "block";
document.getElementById("sw").style.display = "none";
}

var milli = 0;
var sec = 0;
var min = 0;
var hr = 0;

function ssw()
{
document.getElementById("sw").style.display = "block";
document.getElementById("date").style.display = "none";
}

function sw()
{
milli++;

if (milli == 100)
{
milli = 0;
sec++;
}
if (sec == 60)
{
sec = 0;
min++;
}
if (min == 60)
{
min = 0;
hr++;
}

var view = hr+" : "+min+" : "+sec+" : "+milli;

document.getElementById("display").innerHTML=view;
}

function rest()
{
milli = 0;
sec = 0;
min = 0;
hr = 0;
```

Extract 2.2.3.1 shows a sample of a printout from a candidate who provided a correct webpage and managed to create a stop watch as required by using JavaScript and HTML codes.

Candidates who scored low marks performed poorly in part (b) because they failed to use the JavaScript and HTML codes in creating a stop watch. This indicates that candidates lacked knowledge on JavaScript programming. Extract 2.2.3.2 represents a sample of a poor response.

Extract 2.2.3.2

```
<html>
<head><title>Watch</title><head>
<body>
Thur Dec 24 21:17:37 2012
<br>
<button onclick=alert(Date())>Date</button>
<button onclick=alert(Stopwatch())>Stopwatch</button>
</body>
</html>
```



Extract 2.2.3.2 shows a sample of a printout from a candidate who failed to use the JavaScript and HTML codes to create stopwatch.

3.0 CONCLUSION

In general, the performance of the candidates in this year's Computer Science examination (ACSEE) is good. Most of the candidates answered the questions correctly to a great extent and therefore scored good marks. The candidates' good performance may be attributed by sufficient knowledge and correct interpretation of the requirement of the question. The analysis shows that topics which were well answered include *Data communication and Networking*, *C++ Programming, Computer Security and privacy, Problem Solving, System Development, IT Environment, Website Development* and *Data presentation*. Averagely done topics are; *Visual Programming, Information Systems* and *Computer Basics*.

However, few candidates performed poorly due to a number of reasons including; wrong interpretation of the requirement of the questions, insufficient knowledge, poor mathematical skills, lack of skill in responding to the questions and poor ability in explaining the response. Further analysis on how the candidates performed in different topics is summarized in Appendix. The analysis on individual items indicates that, most candidates had experienced difficulties in answering questions which involved programming languages; such questions were 7 and 9. The analysis further showed that most candidates had problem in question 5 which involved drawing of the normalized relationship based on information systems. The candidates also had problem in understanding the requirement of the question for example question 9 in paper one. Question number 13 in paper 1 was avoided by most of the candidates due to lack of knowledge and practical skill of Website Development. However, the performance of this question was good.

These challenges are just spotlighting the need of full involvement of education stakeholders including teachers/instructors and candidates in improving the teaching and learning process for the better performance of the field in future.

4.0 RECOMMENDATIONS

4.1 Recommendations to MOEVT:

The Ministry of Education and Vocational Training has to play the first primary role in improving computer science performance by doing the following:-

(a) To deliver the act which allows starting combination of Computer Science subject that will motivate more candidates to learn this subject as well as widen up opportunities.

(b) To prepare Computer Science texts books for secondary school since there are no text books used to deliver equal skills for candidates as per syllabus;

(c) Improve ICT infrastructure in all schools countrywide;

(d) Conduct time to time professional development to ICT teachers so as to have them update.

4.2 Recommendations to teachers:

Teachers are the central key player in imparting the knowledge and skills in any teaching/learning process. Computer Science teachers are advised to:-

(a) Ensure effective syllabus coverage in time;

(b) Form strategies to assist slow learners to master the required skills and

(c) Provide enough exercises and tests to enhance the candidates' mastery of some key concepts in the classroom environment.

4.3 Recommendations for future candidates:

A large number of candidates performed good in this subject and therefore the prospective candidates are urged to:

(a) Prepare themselves well for the examination so as to be able to attempt all the required questions;

(b) Read the examination questions carefully so as to be able to respond to the tasks in each question including all the sub-parts if any;

(c) Change their mindset towards Computer Science as an optional subject but as a bridge to higher learning and self-employment; and

(d) Should master English Language which enables them to understand the requirement of the questions.

APPENDIX

Summary of Performance of the Candidates – Topic wise

S/n	Topic	No. of Question(s)	Percentage of Candidates who Scored Average of 30% or Above	Recommendations
1	System Development	1	98.9	Good
2	Problem Solving	2	97.9	Good
3	IT Environment	1	97.6	Good
4	Website Development	2	92.1	Good
5	Computer Security and Privacy	1	84.2	Good
6	Data Communication and Networking	1	81.1	Good
7	Data presentation	1	74.5	Good

S/n	Topic	No. of Question(s)	Percentage of Candidates who Scored Average of 30% or Above	Recommendations
8	C++ programming	3	68.8	Good
9	Visual Programming	3	47.4	Average
10	Information Systems	1	38.5	Average
11	Computer Basics	1	32.6	Average