THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

136/1 **COMPUTER SCIENCE 1**

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year : 2020**

Instructions

1. This paper consists of sections A and B with a total of **thirteen (13)** questions.
2. Answer **all** questions in section A and **two (2)** questions from section B.
3. Section **A** carries **sixty (60)** marks and section **B** carries **forty (40)** marks.
4. Communication devices and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Use standard distinctive symbols to outline the main three Boolean Operators

The three main Boolean operators are AND, OR, and NOT. The AND operator is represented by a dot (·) or by writing variables together (AB). Its distinctive logic gate symbol is the D-shaped gate with two or more inputs and one output.

The OR operator is represented by a plus sign (+). Its logic gate symbol looks like a curved shape with two or more inputs and one output.

The NOT operator is represented by a bar over a variable ($\overline{A}$) or by a prime symbol (A'). Its logic gate symbol is a triangle pointing to the right with a small circle at the tip.

(b) Draw a logic gate circuit for the Boolean expression AB' + C'(A + B)

The expression has two main parts: AB' and C'(A + B). AB' means A AND NOT B. C'(A + B) means NOT C AND (A OR B). Both outputs are finally joined using OR. So the circuit uses an AND gate for A and NOT B, an OR gate for A and B, another AND gate for NOT C with (A + B), and finally an OR gate to combine the two results.

(c) Simplify the Boolean expression f = (AB'(A + C))' + A'B(A + B' + C')'

First simplify inside terms:
AB'(A + C) = A(A + C)B' = AB' (since A(A + C) = A).
So the first part becomes (AB')'.

Now simplify second part: (A + B' + C')' = A'B C (by De Morgan's theorem).
So A'B(A + B' + C')' = A'B(A'B C) = A'B C.

Therefore, f = (AB')' + A'B C.
Now (AB')' = A' + B.

So f = (A' + B) + A'B C.
This simplifies to A' + B.

Hence the simplified expression is f = A' + B.

Using NOR gates only, the circuit can be drawn by replacing A' with (A NOR A) and B as (B NOR B)' and constructing OR with NOR combinations.

2. (a) Define the term function as applied in programming languages

A function in programming languages is a self-contained block of code designed to perform a specific task. It takes input parameters, processes them, and returns an output. Functions help in reusability and modular programming.

(b) Outline the roles of user defined functions

User defined functions increase reusability since they can be called many times within a program.

They improve program organization by dividing tasks into smaller manageable parts.

They also simplify debugging and maintenance because errors can be traced within a single function without checking the whole program.

(c) Read the block of code and then;

(i) The name of the function is given by the identifier after the return type. For example, if the code has int addNumbers(int a, int b), the name is addNumbers.

(ii) The number of parameters is the count of input variables in brackets. For example, in int addNumbers(int a, int b) the parameters are two.

(iii) To determine if the code will perform the required task, you check whether the function body contains correct logic. If it adds a + b and returns the sum, then it will perform correctly; if not, it fails.

(d) With the aid of an example of a code statement, give two similarities and differences between ‘cin’ and ‘cin.getline’.

Similarities: Both are input commands in C++ and both take values from the user via the keyboard.

Differences: cin reads input until the first whitespace, while cin.getline reads a full line including spaces until the enter key is pressed. Also, cin is commonly used for numbers and single words, whereas cin.getline is used for strings with multiple words.

Example:
cin >> name; reads one word into variable name.
cin.getline(name, 50); reads up to 50 characters including spaces into name.

3. (a) Describe the web server

A web server is a computer system or software that stores, processes, and delivers web pages to users upon request. When a user enters a web address, the web server responds by sending the requested content via HTTP or HTTPS protocols.

(b) Outline four steps to be followed when creating a website

The first step is planning, which involves determining the purpose and target audience of the website.

The second step is designing, which includes creating the layout, structure, and user interface.

The third step is development, where the actual coding is done using HTML, CSS, JavaScript, or other technologies.

The fourth step is deployment and testing, where the site is uploaded to a server and tested for errors before going live.

(c) By using HTML and JavaScript codes, develop HTML form with one input field named “number” and a submit button called “process”

<!DOCTYPE html>

<html>

<head>

```
<title>Number Check</title>

<script>

function checkNumber() {

  var num = document.getElementById("number").value;

  if (isNaN(num) || num <= 0) {

    alert("Error: Provide a number greater than 0");

  } else if (num % 2 == 0) {

    alert("The number provided is divisible by 2");

  } else {

    alert("The number provided is not divisible by 2");

  }

}

</script>

</head>

<body>

<form onsubmit="checkNumber(); return false;">

  Enter number: <input type="text" id="number">

  <input type="submit" value="process">
```

```
</form>

</body>

</html>
```

4. (a) Explain four elements of information systems

The first element is hardware, which includes physical devices like computers, servers, and networking equipment.

The second element is software, which refers to applications and programs that process data and manage tasks.

The third element is data, which is raw facts and figures that are processed to generate meaningful information.

The fourth element is people, who are the users and managers that interact with the system to achieve organizational goals.

(b) Explain the meaning of relational database query

A relational database query is a request for data retrieval or manipulation using SQL commands on a relational database that stores data in tables with rows and columns. Queries are used to search, update, insert, or delete data.

(c) Use the following entity set with its attributes to answer the questions

(i) Represent entity set into its equivalent relation table. If entity set is Students (StudentID, Name, Age, Course), then table is:
STUDENTS(StudentID, Name, Age, Course)

(ii) Write SQL query to create students database table:

```
CREATE TABLE Students (
  StudentID INT PRIMARY KEY,
  Name VARCHAR(50),
  Age INT,
  Course VARCHAR(50)
);
```

(iii) Write SQL insert data into students table:

```
INSERT INTO Students (StudentID, Name, Age, Course)
VALUES (1, 'Peter', 20, 'Computer Science');
```

(iv) Write SQL query required to retrieve data from students table:

```
SELECT * FROM Students;
```

5. (a) Explain three purposes of procedures in Visual Basic programs

Procedures help in code reusability because a block of code written once can be called many times.

They increase readability and organization of code by separating tasks into smaller parts.

They also make debugging and maintenance easier since errors can be traced within specific procedures.

(b) Mention four control structures supported by Visual Basic

Visual Basic supports sequence structure, selection structure (If...Then...Else, Select Case), iteration structure (For...Next, Do While, Do Until), and procedure call structure (Sub and Function).

(c) Explain why it is necessary to choose Standard.Exe file command from the file menu when creating a Visual Basic project

It is necessary because Standard.Exe provides the default environment for creating executable applications in Visual Basic. It ensures that the project can be compiled into an .exe file for standalone use.

(d) Write a VB program to display current date and time in a Form while showing the number of procedures used

```
Private Sub Form_Load()

  Call ShowDateTime

End Sub



Private Sub ShowDateTime()

  MsgBox "Current Date and Time: " & Now

  MsgBox "Number of procedures used: 2"

End Sub
```

6. (a) Differentiate piracy from privacy terms as applied in data security

Piracy refers to the illegal copying, distribution, or use of software, music, movies, or digital products without authorization from the owner. It is a violation of intellectual property rights and reduces revenue for creators.

Privacy refers to the protection of personal or sensitive information from unauthorized access. It ensures that data belonging to individuals or organizations is not exposed or misused without consent.

(b) List two ways of reducing piracy

One way is enforcing strict copyright laws and software licensing to discourage illegal use.

Another way is using digital rights management (DRM) systems to control how digital content is copied or shared.

(c) Explain two control measures used to enforce data and information security against unauthorized access

One control measure is the use of authentication methods such as strong passwords, biometric verification, or two-factor authentication to ensure only authorized users can access data.

Another control measure is encryption, which converts data into unreadable form so that even if intercepted, it cannot be understood without a decryption key.

(d) List four points addressed by the use of copyright laws over hardware and software protection

Copyright laws ensure that creators and developers are recognized for their work.

They protect against unauthorized copying and distribution of software and hardware designs.

They provide legal grounds for seeking compensation when piracy occurs.

They encourage innovation by giving assurance to developers that their intellectual property will be safeguarded.

7. (a) Explain four common features of Graphical User Interface (GUI) available in Microsoft Word

One feature is the Ribbon, which provides organized tabs containing commands and tools for easy access.

Another feature is the toolbar, which offers shortcuts to frequently used commands like save, undo, and redo.

The third feature is the dialog box, which provides additional options for customizing settings and features.

The fourth feature is menus and icons, which make navigation simple and allow users to quickly identify functions by graphical symbols.

(b) Differentiate SUM from SUMIF functions as used in Microsoft Excel

The SUM function adds all the numbers in a given range without conditions.

The SUMIF function adds numbers in a range only if they meet a specified condition or criterion.

(c) Write the syntax of SUM and SUMIF functions

The syntax for SUM is:
=SUM(number1, number2, …)

The syntax for SUMIF is:
=SUMIF(range, criteria, [sum_range])

(d) Write the functions required to find the total amount from north region of the given sales table

If the table has Region in column A and Amount in column B, the function would be:
=SUMIF(A2:A10, "North", B2:B10)

8. Draw a flowchart and write C++ program that reads a given set of integers and then prints the number of odd and even integers. The program should also generate the number of zeros.

Flowchart steps:
Start → Input N (number of integers) → Loop through each integer → If number = 0, increase ZeroCount → Else if number % 2 = 0, increase EvenCount → Else increase OddCount → After loop, display EvenCount, OddCount, ZeroCount → End.

C++ program:

```
#include <iostream>

using namespace std;

int main() {

   int n, num, evenCount = 0, oddCount = 0, zeroCount = 0;
```

```
    cout << "Enter number of integers: ";
    cin >> n;
    for (int i = 0; i < n; i++) {
        cout << "Enter integer " << i + 1 << ": ";
        cin >> num;
        if (num == 0) {
            zeroCount++;
        } else if (num % 2 == 0) {
            evenCount++;
        } else {
            oddCount++;
        }
    }
    cout << "Even numbers: " << evenCount << endl;
    cout << "Odd numbers: " << oddCount << endl;
    cout << "Zeros: " << zeroCount << endl;
    return 0;
}
```

9. Describe three classifications of data transmission media in the guided and unguided media

In guided media, the signal travels through a physical medium. One classification is twisted pair cables, which are two insulated copper wires twisted together to reduce interference.

Another classification is coaxial cables, which have a central conductor surrounded by insulation and shielding, used for cable television and networking.

A third guided medium is fiber optic cables, which transmit data as light pulses through glass or plastic fibers, offering high speed and security.

In unguided media, data travels through the air or space. Examples include radio waves used in broadcasting and Wi-Fi, microwaves used in satellite communication, and infrared signals used in remote controls.

10. Explain how Information and Communication Technology has brought about different career opportunities to most of Tanzanians by referring to at least six career opportunities

ICT has created opportunities in software development, where Tanzanians can work as programmers, application developers, and system designers.

It has opened careers in networking and system administration, allowing people to manage and maintain computer networks for organizations.

It has supported the growth of digital marketing, enabling careers in online advertising, content creation, and social media management.

ICT has provided opportunities in e-commerce and online business, allowing individuals to create and manage online shops.

It has expanded career opportunities in ICT training and education, where professionals can work as instructors in schools, colleges, and training centers.

Lastly, ICT has supported data analysis and research careers, where professionals use computers and software to analyze trends and support decision-making in organizations.