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: 2015**

Instructions:

1. this paper consists of section A and B with total of ten questions
2. Answer all questions in Section A and two questions in section B
3. Use a blue or black pen.

1. (a) Explain the function of each component of Central Processing Unit.
The Central Processing Unit (CPU) is composed of three primary components, each with specific functions:
i. Arithmetic Logic Unit (ALU): Responsible for performing arithmetic operations (e.g., addition, subtraction) and logical operations (e.g., comparisons, AND, OR).
ii. Control Unit (CU): Directs the flow of data between the CPU and other components of the computer. It interprets instructions from programs and manages the execution of those instructions.
iii. Registers: Small, fast storage locations within the CPU that temporarily hold data, instructions, or intermediate results during processing.

(b) State six steps required to insert automatically a table of contents in Microsoft Word document.
i. Open the document and place the cursor where the table of contents will appear.
ii. Click on the "References" tab in the ribbon menu.
iii. Select "Table of Contents" from the toolbar.
iv. Choose a predefined format or style for the table of contents from the dropdown menu.
v. Word will automatically generate the table of contents based on the heading styles applied in the document.
vi. Update the table of contents by selecting it and clicking "Update Table" whenever changes are made to the document structure.

2. (a) Differentiate Multiplexer from Demultiplexer.
i. Multiplexer: A device that combines multiple input signals into a single output signal. It is used to transmit several data lines over one communication channel.
ii. Demultiplexer: A device that takes a single input signal and distributes it to one of many output lines. It is used to reverse the operation of a multiplexer.

(b) State and use Boolean laws of algebra to simplify the following Boolean expression: F(x, y, z) = xy + xz' + yz.
Solution:
Apply the Distributive Law:
F(x, y, z) = x(y + z') + yz.
Apply the Absorption Law:
F(x, y, z) = x + yz.

3. Identify three types of computer networks and in each state three characteristics.
i. Local Area Network (LAN):
- Covers a small geographical area such as a single building.
- High data transfer speeds.
- Limited to a specific number of connected devices.

ii. Wide Area Network (WAN):
- Covers a large geographical area such as cities or countries.
- Relatively slower data transfer speeds compared to LAN.
- Involves public communication links like satellites and leased telephone lines.

iii. Metropolitan Area Network (MAN):
- Covers a city or campus.
- Larger than LAN but smaller than WAN.
- Uses high-speed connections like fiber optics.

4. (a) Explain three main steps required to create an application in Visual Basic programming.
i. Design the user interface by placing controls such as buttons, labels, and text boxes on the form.
ii. Write the code by adding event-handling procedures for the controls.
iii. Compile and run the application to test its functionality and debug if necessary.
(b) Name and give the function of the controls A, B and C in the figure below:
i. Control A: Label - Used to display static text or messages on the form.
ii. Control B: Picture Box - Used to display images or graphics in an application.
iii. Control C: Text Box - Used to input or display text entered by the user.

5. (a) (i) What is the effect that someone is likely to see when a piece of code system("pause"); has not been included in any C++ program and command prompt is not considered?
If the system("pause"); code is not included, the program will execute and close the command prompt window immediately, preventing the user from viewing the output.

(ii) With an example, explain how you can declare logical variables in C++ programming language.
Logical variables in C++ are declared using the `bool` data type. They can store only two values: `true` or `false`.
Example:

```
bool isAvailable = true;
bool isComplete = false;
```

(b) Identify all errors from the following program which can prevent it from creating a corresponding executable file.

```
#include <math>
using namespace std;
main()
{
  width; Length;
  cout<<"Enter width"<<endi;
  cin>>width;
  cout<<"Enter length"<<endi;
  cin>>length;
  area=width x length;
  cout<<Area<<endl;
  system("Pause")
```

```
  return 0;
}
```
Errors:
i. Missing semicolons after some statements such as `system("Pause")`.
ii. Incorrect include directive `<math>`; it should be `<cmath>`.
iii. Missing data types for variables `width` and `Length`.
iv. Incorrect keyword `endi`; it should be `endl`.
v. Use of `x` for multiplication instead of `*`.
vi. Variable `area` and `Area` are not declared, and the names do not match (case sensitivity).
vii. The `main()` function should have a return type, such as `int main()`.

6. (a) Give four characteristics of the First Normal Form (1NF).

First Normal Form (1NF) is the simplest form of database normalization. Its characteristics include:
i. Atomicity: All values in a database column must be atomic, meaning that each cell contains only one value (no repeating groups or arrays).
ii. Uniqueness: Each column must have a unique name, making it distinguishable within the table.
iii. Order Independence: The sequence of rows and columns does not matter; the data should still hold the same logical meaning.
iv. No Duplicate Rows: Every row must be unique, ensuring no two rows in the table contain identical data.
(b) With two examples, explain the concept of functional dependencies.

Functional dependency occurs when the value of one attribute (column) in a table determines the value of another attribute.
Example 1: In a table with columns `Student_ID` and `Student_Name`, `Student_ID` uniquely determines `Student_Name`.
Example 2: In an `Order` table, `Order_ID` determines `Customer_Name` and `Order_Date`, meaning that knowing the `Order_ID` allows us to identify the corresponding customer and order date.

7. (a) Define the term problem solving.

Problem solving is the process of identifying a challenge or issue, analyzing its components, and devising and implementing a suitable solution to achieve a desired outcome. In computing, it involves breaking a problem into smaller tasks, creating algorithms, and using logical reasoning to develop efficient solutions.

(b) Design an algorithm in pseudocode that reads an integer “n” from the keyboard, then computes and displays the sum of integers (1+2+…+n) on the screen. If “n” is less than 0, the program displays “Error in input.” Hence, use the algorithm to find the sum when n=5.

Algorithm:
i. Start
ii. Input n
iii. If n < 0, print “Error in input” and stop

iv. Initialize sum = 0
v. For i = 1 to n:
  sum = sum + i
vi. Print sum
vii. Stop
For n=5:
Sum = 1 + 2 + 3 + 4 + 5 = 15

8. (a) Explain the significance of HTML form.

HTML forms are used to collect user input and send it to a server for processing. They play a significant role in web applications, enabling interactions like login forms, survey submissions, and online purchases. Forms provide a structured way to gather data, ensuring consistency and usability.

(b) Write HTML codes which generate the output below:

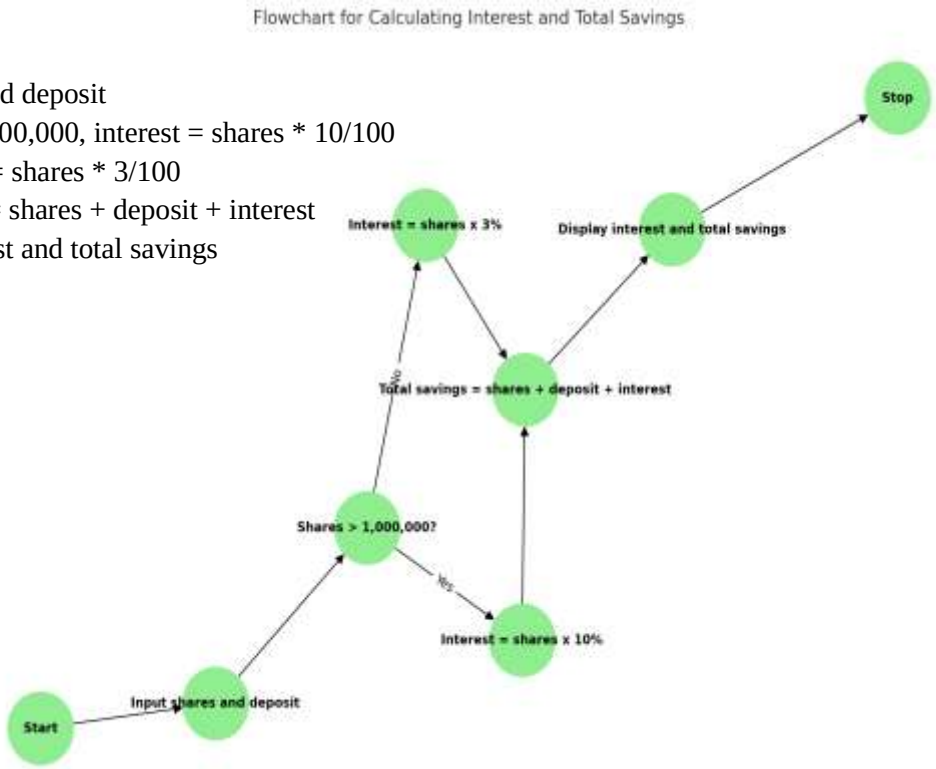
Contact Information
Name: _____ E-mail: _____

```
<!DOCTYPE html>
<html>
<head>
  <title>Contact Information</title>
</head>
<body>
  <h2>Contact Information</h2>
  <form>
    <label for="name">Name:</label>
    <input type="text" id="name" name="name"><br><br>
    <label for="email">E-mail:</label>
    <input type="email" id="email" name="email"><br><br>
    <input type="submit" value="Submit">
  </form>
</body>
</html>
```

9. Mwenge Savings Society (MSS) pays 10% interest on shares exceeding 1,000,000 shillings and 3% paid on shares that do not meet this target. However, no interest is paid on deposits in the member's bank account. Design an algorithm (flowchart) for a program that would:
(a) Prompt the user for shares and deposit of a particular member.
(b) Calculate the interest and total savings.
(c) Display the interest and total savings on the screen for a particular member of the society.

Algorithm:

i. Start
ii. Input shares and deposit
iii. If shares > 1,000,000, interest = shares * 10/100
iv. Else, interest = shares * 3/100
v. Total savings = shares + deposit + interest
vi. Display interest and total savings
vii. Stop



10. (a) Describe the basic ideas of intellectual property and copyright.

Intellectual property refers to creations of the mind, such as inventions, literary works, designs, and symbols, that are protected by law. Copyright is a type of intellectual property that gives creators exclusive rights to their original works, such as books, music, and software, preventing unauthorized use or duplication.

(b) Explain the open source and non-open source software.

Open source software is software with publicly available source code, allowing anyone to view, modify, and distribute it. Examples include Linux and Apache. Non-open source software, also known as proprietary software, has source code that is not publicly available and requires licenses for use. Examples include Microsoft Windows and Adobe Photoshop.