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 : 2018**

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. Describe four categories of data which can be entered on a Microsoft Excel sheet.

The first category is labels, which are text entries such as names, titles, or descriptions used to identify data in the sheet. They cannot be used in calculations but help in organizing information.

The second category is values, which are numeric entries like prices, quantities, or percentages. They are important because they can be used directly in formulas and calculations.

The third category is formulas, which are instructions to perform calculations or operations on values. For example, =SUM(A1:A5) adds the numbers in cells A1 through A5.

The fourth category is functions, which are predefined formulas built into Excel to perform complex calculations. Examples include AVERAGE(), MAX(), and IF().

2. Mention six components of the Integrated Development Environment (IDE) in Visual Basic and explain the function of IDE.

One component is the code editor, which is where programmers write and edit program code.

Another is the form designer, which allows the user to visually design the interface of an application by placing controls like buttons and text boxes.

The toolbox is also a component, providing tools and controls that can be dragged and dropped onto forms to build user interfaces.

The project explorer is another component, which helps organize and manage files, forms, and modules within the project.

The properties window is important because it allows the programmer to set and modify properties of forms and controls, such as size, color, or text.

The debugging tools are also part of the IDE, enabling the programmer to run, pause, and check the code for errors to ensure the program runs correctly.

The function of the IDE is to provide an integrated environment where programmers can write, test, debug, and manage their code efficiently in one platform.

3. (a) Differentiate logic diagram from truth table.

A logic diagram is a graphical representation of a logical expression using standard symbols such as AND, OR, and NOT gates. It shows how input signals are processed to produce an output.

A truth table, on the other hand, is a tabular representation of all possible input combinations and their corresponding outputs. It provides a clear numerical view of how a logic expression behaves.

(b) (i) With clear steps, write a simplified Boolean expression for the output "F".

Since the figure is not shown in the paper extract, the general approach is to apply Boolean algebra laws such as distribution, DeMorgan's law, and absorption to reduce the expression to its simplest form.

(ii) Construct the equivalent truth table for the simplified expression.

After simplification, the truth table would list all possible input combinations and the resulting output F. Each row shows whether the output is true or false for a given set of inputs.

4. (a) Explain the term Pseudocode.

Pseudocode is a way of writing algorithms in a structured, plain language format that resembles programming but is not bound by strict syntax rules. It allows programmers to outline the logic of a program before coding it in a real language.

(b) Tanzania Youth Bank (TYB) scenario.

(i) Pseudocode for the algorithm:

Start

```
Input Name

Input Shares

Input Deposit

If Shares > 200000 then

  Interest = 0.1 * Shares

Else

  Interest = 0.02 * Shares

End If

TotalSavings = Shares + Deposit + Interest

Display Name, Interest, TotalSavings

End
```

(ii) This pseudocode calculates the interest based on the condition and adds it to shares and deposit to display total savings.

5. (a) Explain three types of HTML lists.

The first type is ordered lists, which display items in a sequence with numbers or letters, such as 1, 2, 3. They are useful when order is important.

The second type is unordered lists, which display items with bullets, such as dots or squares. They are used when order does not matter.

The third type is definition lists, which consist of terms and their descriptions. They are used for glossaries or to define key concepts.

(b) Provide HTML codes which generated the following login form.

```
<!DOCTYPE html>

<html>

<head>

<title>Login Form</title>

</head>

<body>

<form>

  Username: <input type="text" name="username"><br><br>

  Password: <input type="password" name="password"><br><br>

  <input type="submit" value="Login">

</form>

</body>

</html>
```

6. (a) Define the term wireless network.

A wireless network is a computer network that uses radio waves or infrared signals instead of physical cables to connect devices and enable communication.

(b) Study the figure and answer the questions.

(i) The figure includes topologies such as bus, star, and possibly ring depending on the arrangement of the devices shown.

(ii) Device A is likely a hub or switch, while device B is a router.

(iii) Device B is necessary because it connects the internal network to external networks such as the internet, providing routing and control functions.

(c) One advantage of the topology used in the administration network, which is usually a star, is that failure of one device does not affect the others since each has an independent connection to the hub or switch.

7. (a) Explain the term “requirement specifications” as used in software development.

Requirement specification is a detailed description of the functions, features, and constraints of a software system. It defines what the system should do and serves as a guide for developers and stakeholders.

(b) Explain three considerations to be included in the requirement specification stage.

One consideration is functional requirements, which describe the specific tasks or functions the software must perform.

Another is non-functional requirements, which define system qualities such as performance, reliability, and security.

User requirements are also considered, ensuring that the system aligns with the needs and expectations of end users.

(c) Describe two roles of testing phase in software development life cycle.

The testing phase ensures that the software works as expected by detecting and fixing errors before deployment.

It also verifies that the system meets the original requirements and performs reliably under different conditions.

8. (a) Differentiate data availability from data confidentiality.

Data availability refers to the ability of authorized users to access data whenever needed without interruptions. It ensures business continuity and reliability of services.

Data confidentiality, on the other hand, means protecting data from unauthorized access and ensuring that only permitted users can view sensitive information.

(b) Describe four physical threats to data security.

One threat is fire, which can destroy servers, computers, and storage devices containing data.

Another threat is theft of hardware, where unauthorized people steal computers or drives containing sensitive information.

A third threat is natural disasters such as floods or earthquakes, which can damage infrastructure and cause permanent data loss.

The fourth is power failures, which can damage equipment or lead to loss of unsaved data.

9. (a) Explain the presentation of hexadecimal number system and give the range of digits and letters used to represent hexadecimal numbers.

The hexadecimal number system is a base-16 system that uses sixteen unique symbols to represent values. It combines digits from 0 to 9 and letters from A to F, where A represents 10, B represents 11, C represents 12, D represents 13, E represents 14, and F represents 15. Each digit in a hexadecimal number corresponds

to a power of 16, making it very efficient for representing binary values in a compact form. The range of digits and letters is therefore 0–9 and A–F.

(b) Convert $A90F_{16}$ number system into:

(i) its binary equivalent.

A = 10 = 1010

9 = 9 = 1001

0 = 0 = 0000

F = 15 = 1111

So, $A90F_{16} = 1010\ 1001\ 0000\ 1111_2$.

(ii) its decimal equivalent.

$A90F_{16} = (A \times 16^3) + (9 \times 16^2) + (0 \times 16^1) + (F \times 16^0)$

$= (10 \times 4096) + (9 \times 256) + (0 \times 16) + (15 \times 1)$

$= 40960 + 2304 + 0 + 15$

$= 43279$

So, $A90F_{16} = 43279_{10}$.

10. (a) Explain the meaning of the term Information system.

An information system is a structured combination of people, hardware, software, data, and procedures that work together to collect, process, store, and distribute information. It is designed to support decision-making, coordination, analysis, control, and visualization in organizations.

(b) Elaborate two roles of information system analyst.

One role is to gather and analyze user requirements to design systems that meet organizational needs effectively. The analyst ensures that the final system aligns with user expectations.

Another role is to act as a bridge between technical developers and non-technical users by translating business requirements into technical specifications. They also ensure the system is functional, efficient, and cost-effective.

(c) Describe three main purposes of information system in an organization.

The first purpose is to improve decision-making by providing accurate, timely, and relevant information to managers and staff.

The second is to support day-to-day operations, such as processing transactions, tracking inventory, and managing resources.

The third is to improve communication and coordination within the organization by facilitating data sharing and collaboration among departments.

11. Describe the decimal, binary, octal and hexadecimal number systems and give an example for each type.

The decimal system is a base-10 number system that uses digits from 0 to 9. It is the most commonly used system in daily life. For example, 245 is a decimal number.

The binary system is a base-2 number system that uses only two digits, 0 and 1. It is used internally by computers to represent data and instructions. For example, 1011_2 equals 11 in decimal.

The octal system is a base-8 number system that uses digits from 0 to 7. It is sometimes used as a shorthand representation of binary numbers. For example, 157_8 equals 1110111_2.

The hexadecimal system is a base-16 number system that uses digits 0 to 9 and letters A to F. It is often used in programming and computer memory addressing. For example, $2F_{16}$ equals 47 in decimal.

12. Describe four problems caused by storing data redundantly in a database and explain how the first three levels of normalization can be used to avoid data redundancy.

One problem caused by redundant data is increased storage requirements, since the same data is stored multiple times unnecessarily, which wastes space.

Another problem is inconsistency, where different copies of the same data may not match. This makes it difficult to determine which copy is correct.

A third problem is difficulty in updating, because every duplicate record must be modified whenever a change is made. If some are missed, inconsistencies arise.

A fourth problem is reduced efficiency in query processing, as the database has to scan through more data, leading to slower performance.

Normalization helps solve these problems. First Normal Form (1NF) ensures that each column contains atomic values, eliminating repeating groups and reducing duplication.

Second Normal Form (2NF) removes partial dependencies by ensuring that every non-key attribute depends on the whole primary key, reducing redundant data spread across tables.

Third Normal Form (3NF) eliminates transitive dependencies by ensuring that non-key attributes depend only on the primary key and not on other non-key attributes, further reducing redundancy.

13. Draw a flowchart, write pseudocodes and use the while...loop to construct a C++ program that could:
    (i) Read a positive integer N.
    (ii) Calculate and print (expression missing in the scan).

Since the exact expression is missing in the paper, the general solution is given for calculating a series such as factorial or summation.

Pseudocode:

Start

Input N

Set Sum = 0

Set i = 1

```
While i <= N
  Sum = Sum + i
  i = i + 1
End While
Print Sum
End
```

C++ program:

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

int main() {
   int N, i = 1, Sum = 0;
   cout << "Enter a positive integer: ";
   cin >> N;
   while(i <= N) {
      Sum += i;
      i++;
   }
```

```
    cout << "Sum = " << Sum << endl;

    return 0;

}
```

This program reads a positive integer N, then uses a while loop to calculate the sum of integers from 1 to N and prints the result.