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: 2022**

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. The headmaster of a certain school assigned you a task to create a school database that will store a record of students' information using Microsoft Access. The database should be featured by a friendly user interface and restricts unauthorized access to information.

(a) Explain the feature you would use to design a friendly user interface.

To create a friendly user interface in Microsoft Access, the "Form" feature is used. Forms allow users to interact with the database through a simplified, organized, and visually appealing interface. Users can easily input, edit, and retrieve data without interacting directly with tables or queries.

(b) Describe the steps you would use to create that feature in 1(a).

i. Open the database in Microsoft Access.
ii. Click on the "Create" tab and select "Form Wizard" or "Blank Form."
iii. Choose the fields from the database tables that you want to include in the form.
iv. Arrange and design the layout by adding labels, text boxes, and buttons to enhance usability.
v. Apply themes or formatting to improve the appearance of the form.
vi. Save and test the form to ensure it functions as intended.

(c) Explain three data security tools that can be applied to enforce security in a school database.

i. Access Control: Implement user authentication mechanisms, such as usernames and passwords, to restrict access to authorized personnel only.
ii. Encryption: Encrypt sensitive data to protect it from unauthorized access, ensuring that it remains secure even if intercepted.
iii. Backup and Recovery: Regularly back up the database to prevent data loss due to hardware failure or cyber-attacks, ensuring data integrity.

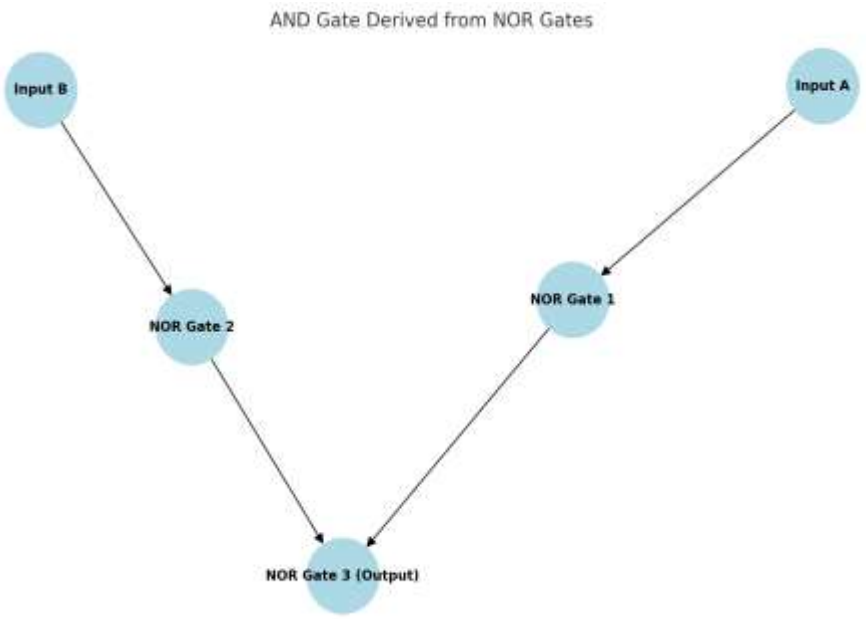
2. (a) Why is it more efficient for a computer to use hexadecimal number system instead of binary number system for data representation? Briefly explain by giving two reasons.

i. Compact Representation: Hexadecimal numbers use fewer digits compared to binary numbers, making them easier to read and write.
ii. Easier Conversion: Hexadecimal is directly compatible with binary, allowing quick and straightforward conversion between the two systems.

(b) Simplify the following Boolean expression and draw its logic gate:
F = XY + XYZ + XY'Z + XYZ'
Simplified Expression:
F = XY + XY'Z
F = X(Y + Y'Z)
F = XY + XZ
Logic Gate: The circuit involves two AND gates and one OR gate to implement the simplified expression.

(c) With the aid of a diagram, use the concept of logic gate to illustrate how AND gates can be derived from NOR gate.

Ans: To derive an AND gate using NOR gates, you need three NOR gates:
i. The inputs are inverted using two NOR gates.
ii. The inverted inputs are then fed into the third NOR gate.



3. You have been requested by a Natma Mall Director to construct a system that will offer a discount of 10% if the quantity purchased costs more than Tshs. 100,000/-. The system prompts a seller to enter the quantity and price per item through a keyboard:

(a) Write a pseudocode to calculate the total payable amount for any customer purchasing items from Natma Mall.

Pseudocode:
Start
Input Quantity, PricePerItem
TotalCost = Quantity * PricePerItem
If TotalCost > 100000 Then
  Discount = TotalCost * 0.1
  TotalPayable = TotalCost - Discount
Else
  TotalPayable = TotalCost
End If
Output TotalPayable
Stop

(b) Write a corresponding C++ program from the pseudocode obtained in 3(a).

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

int main() {
   float quantity, pricePerItem, totalCost, discount = 0, totalPayable;
   cout << "Enter quantity: ";
   cin >> quantity;
   cout << "Enter price per item: ";
   cin >> pricePerItem;

   totalCost = quantity * pricePerItem;

   if (totalCost > 100000) {
      discount = totalCost * 0.1;
   }

   totalPayable = totalCost - discount;

   cout << "Total payable amount: " << totalPayable << endl;
   return 0;
}
```

4. (a) Differentiate a message “MAMBO” from “WKDQNBRX”.

The message “MAMBO” is in plaintext, meaning it is readable in its original form, while “WKDQNBRX” is encrypted, meaning it has been encoded using a cipher to make it unreadable without decryption.

(b) What happened to the sent message which affects the word MAMBO to change its letters?

The message was encrypted using a substitution cipher, likely a Caesar cipher, where each letter in the plaintext is shifted by a certain number of positions in the alphabet.

(c) Explain two methods that can be used to ensure safe communication between student A and B.

i. End-to-End Encryption: Ensures that only the intended recipient can decrypt the message, making it secure during transmission.

ii. Use of Secure Communication Platforms: Platforms like Signal or WhatsApp provide built-in encryption to safeguard messages against unauthorized access.

5. Form six students have decided to design a school website. In one of the pages, they include information related to time management in a class as it appears in Figure 1.

Write HTML codes that used to display a designed page.

Use the following Page Descriptions:
(i) Page background colour should be Magenta.
(ii) Heading should have level 1 effect.
(iii) Text colour of the last sentence should be red.
(iv) When a user clicks 'View Day & Time' button, a statement 'Play Your Part As ……' should be replaced with a current day and time.

```html
<!DOCTYPE html>
<html>
<head>
  <title>Class Time Management</title>
  <style>
    body {
      background-color: magenta;
    }
    h1 {
      font-size: 2em;
      text-shadow: 2px 2px 5px grey;
    }
    p.red-text {
      color: red;
    }
  </style>
  <script>
    function displayDateTime() {
      const currentDateTime = new Date().toLocaleString();
      document.getElementById("message").innerHTML =
        "Current Date and Time: " + currentDateTime;
    }
  </script>
</head>
<body>
  <h1>Class Time Management</h1>
  <p>All students in our class are working very hard in order to get good performance in all of our subjects. One of the strategies we have is how we should spend our time effectively every day.</p>
  <p>These are some questions which remind our responsibilities:</p>
  <ul>
    <li>Who am I?</li>
    <li>Where am I?</li>
```

```
    <li>What am I doing?</li>
    <li>Is it the right time?</li>
  </ul>
  <p>To verify the <strong>current day and time</strong> that lets a student remember where he/she should be, click the button below:</p>
  <button onclick="displayDateTime()">View Day & Time</button>
  <p id="message" class="red-text">Play Your Part As a Hardworking Student, Surely You Will Perform MARVELOUS!</p>
</body>
</html>
```

6. (a) Suppose you want to design or customize a form by using controls in a Visual Basic (VB) program, identify the controls that can perform the following tasks on a form:

(i) Enables events to occur repeatedly at a specific interval.
Control: Timer Control.

(ii) Draw circles, ellipses, squares, and rectangles within the form.
Control: Shape Control.

(iii) Display text that is not editable on the form.
Control: Label Control.

(iv) Display information from an existing database.
Control: DataGridView Control.

(b) Describe the relationship between forms and controls as used in Visual Basic (VB) programming.
Forms serve as containers for controls in Visual Basic. Controls are components like buttons, labels, and text boxes that allow users to interact with the program. The form provides a user interface where controls are placed, and these controls perform specific tasks or events defined by the programmer.

(c) Explain the procedures for adding new forms to the Visual Basic (VB) project.
i. Open the project in Visual Basic.
ii. Click on the "Project" menu and select "Add Windows Form."
iii. Choose a form template from the options provided, such as "Blank Form."
iv. Click "Add" to include the new form in the project.
v. Design the form by adding controls and configuring properties as needed.

7. (a) Identify three health risk hazards associated with the extended use of a computer.
i. Eye Strain: Caused by prolonged staring at a screen.
ii. Repetitive Strain Injury (RSI): Due to repetitive use of keyboards and mice, leading to wrist or hand pain.
iii. Back and Neck Pain: Resulting from poor posture or sitting for long periods.

(b) Explain the possible three solutions for each health risk identified in 7(a).

i. Eye Strain:
- Use screen filters or adjust brightness.
- Follow the 20-20-20 rule: Look away every 20 minutes at something 20 feet away for 20 seconds.
- Use anti-glare screens or glasses.

ii. Repetitive Strain Injury (RSI):
- Use ergonomic keyboards and mice.
- Take regular breaks to stretch fingers and wrists.
- Maintain proper typing posture.

iii. Back and Neck Pain:
- Use an ergonomic chair that supports the back.
- Adjust the monitor to eye level.
- Take breaks to walk and stretch regularly.

(c) Briefly explain the main challenge that any IT company may face when disposing of computer parts.

The main challenge is managing electronic waste (e-waste). Computer parts often contain hazardous materials like lead, mercury, and cadmium, which can harm the environment if not disposed of properly. Recycling and adhering to e-waste management regulations are essential but often costly and complex.

6. (a) Suppose you want to design or customize a form by using controls in a Visual Basic (VB) program, identify the controls that can perform the following tasks on a form:

(i) Enables events to occur repeatedly at a specific interval.
Timer Control.

(ii) Draw circles, ellipses, squares, and rectangles within the form.
Shape Control or Graphics Object.

(iii) Display text that is not editable on the form.
Label Control.

(iv) Display information from an existing database.
DataGridView Control or ListView Control.

(b) Describe the relationship between forms and controls as used in Visual Basic (VB) programming.

Forms in Visual Basic act as containers for controls. Controls, such as buttons, text boxes, and labels, are placed on the form to enable user interaction. The form provides the visual interface where controls are embedded, while the controls define specific actions or functionalities that respond to user events, such as clicks or text input.

(c) Explain the procedures for adding new forms to the Visual Basic (VB) project.

i. Open the Visual Basic project.
ii. Go to the "Project" menu and select "Add Windows Form."
iii. Choose the desired form template, such as "Blank Form."
iv. Click "Add" to create the new form.
v. Design the form by adding controls and configuring their properties.
vi. Save the form and link it to the project for integration.

7. (a) Identify three health risk hazards associated with the extended use of a computer.

i. Eye Strain: Prolonged screen time causes discomfort and blurry vision.
ii. Repetitive Strain Injury (RSI): Continuous typing or mouse usage results in pain in the hands or wrists.
iii. Back and Neck Pain: Poor posture or extended sitting leads to musculoskeletal issues.

(b) Explain the possible three solutions for each health risk identified in 7(a).

i. Eye Strain:
- Use anti-glare screens or blue light filters.
- Follow the 20-20-20 rule: Look at an object 20 feet away every 20 minutes for 20 seconds.
- Adjust screen brightness and maintain a comfortable viewing distance.

ii. Repetitive Strain Injury (RSI):
- Use ergonomic keyboards and mice to reduce strain.
- Take regular breaks to stretch hands and wrists.
- Practice proper typing posture to avoid overexertion.

iii. Back and Neck Pain:
- Use an ergonomic chair that provides lumbar support.
- Position the monitor at eye level to reduce neck strain.
- Take short breaks to stand, stretch, and move around.

(c) Briefly explain the main challenge that any IT company may face when disposing of computer parts.

The main challenge is managing e-waste (electronic waste). Computer components often contain hazardous materials like lead, mercury, and cadmium, which can harm the environment if improperly disposed of. Recycling e-waste safely requires specialized facilities and compliance with strict regulations, which can be expensive and logistically challenging.

8. The Dar es Salaam Institute of Technology has recently experienced exponential increase of the students and staff members. The institute has planned to establish a database to store their data and be handled easily. Describe six advantages the institute would enjoy from the new plan.

i. Centralized Data Management: The database will allow all student and staff data to be stored in one central location, improving accessibility and reducing duplication.
ii. Enhanced Data Security: The database can implement user authentication and encryption, ensuring sensitive information remains secure.
iii. Faster Data Retrieval: With indexing and querying capabilities, retrieving specific information becomes quicker and more efficient.
iv. Scalability: The database can grow as the number of students and staff increases, accommodating future expansion.
v. Streamlined Reporting: The database can generate accurate reports on student performance, staff activities, or attendance with minimal effort.
vi. Improved Decision-Making: By analyzing stored data, the management can make informed decisions regarding resource allocation and academic policies.

9. A new bank TBP established in Dodoma is planning to own branches in 10 more regions of Tanzania. The bank wants to have all its offices to be connected electronically. Describe six important devices which can assist the bank to implement the idea.

i. Router: Connects different branches to the central network and manages internet traffic.
ii. Switch: Facilitates communication between devices within the same branch network.
iii. Firewall: Provides network security by monitoring and controlling incoming and outgoing traffic.
iv. Modem: Enables internet connectivity for branches using telephone or cable lines.
v. Access Points: Provides wireless connectivity within branch offices, allowing devices to connect to the network.
vi. Servers: Centralized storage and processing units for managing customer data and inter-branch communication.
10. (a) Design an algorithm using flowcharts for a program to find and print all prime numbers between 1 and 50. The program should also count them and display their number.

Algorithm:
i. Start.
ii. Initialize a counter for prime numbers to 0.
iii. Loop through numbers from 2 to 50.
iv. For each number, check if it is divisible only by 1 and itself.
v. If true, print the number and increment the counter.
vi. Repeat until all numbers are checked.
vii. Print the total count of prime numbers.
viii. Stop.

(b) Use C++ to create the program that would implement the algorithm in 10(a).

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

bool isPrime(int num) {
    if (num <= 1) return false;
    for (int i = 2; i <= num / 2; i++) {
        if (num % i == 0) return false;
    }
    return true;
}

int main() {
    int count = 0;

    cout << "Prime numbers between 1 and 50 are:" << endl;
    for (int i = 2; i <= 50; i++) {
        if (isPrime(i)) {
            cout << i << " ";
            count++;
        }
    }
    cout << endl << "Total prime numbers: " << count << endl;

    return 0;
}
```