THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

136/2 **COMPUTER SCIENCE 2**

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2024**

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 Nobel Academy School (NAS) pays its employees based on the following criteria:

Each employee is enabled with an additional of 20% of the basic salary for House Allowance (HA), 15% for Lunch Allowance (LA), and 5% for Transport Allowance (TA). However, 10% of the basic salary is deducted from each employee's salary for Social Security (SOSE) fund contribution. Fifteen percent (15%) of the gross salary is deducted as Pay as You Earn (PAYE) if the employee's gross salary is more than 200,000 but less than or equal to 500,000. If the employee's gross salary is more than 500,000 but less than or equal to 1,000,000, then 20% of the employee's gross salary is deducted as PAYE. Otherwise, thirty percent (30%) is deducted.

(a) Use C++ programming language to develop a program that prompts a user to enter 100 employees' names. The program should display each employee's Name, Basic Salary, House Allowance (HA), Lunch Allowance (LA), Transport Allowance (TA), Social Security (SOSE) fund, Gross Salary, Pay as You Earn (PAYE), and Net Salary.

Solution:

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

struct Employee {
   string name;
   double basicSalary, HA, LA, TA, SOSE, grossSalary, PAYE, netSalary;
};

void PataData(Employee employees[], int n) {
   for (int i = 0; i < n; i++) {
      cout << "Enter details for employee " << i + 1 << endl;
      cout << "Name: ";
      cin.ignore();
      getline(cin, employees[i].name);
      cout << "Basic Salary: ";
      cin >> employees[i].basicSalary;
   }
}

void KokotoaMshahara(Employee employees[], int n) {
   for (int i = 0; i < n; i++) {
      employees[i].HA = employees[i].basicSalary * 0.20;
      employees[i].LA = employees[i].basicSalary * 0.15;
      employees[i].TA = employees[i].basicSalary * 0.05;
      employees[i].SOSE = employees[i].basicSalary * 0.10;
      employees[i].grossSalary = employees[i].basicSalary + employees[i].HA + employees[i].LA +
employees[i].TA;
```

```
        if (employees[i].grossSalary > 200000 && employees[i].grossSalary <= 500000) {
            employees[i].PAYE = employees[i].grossSalary * 0.15;
        } else if (employees[i].grossSalary > 500000 && employees[i].grossSalary <= 1000000) {
            employees[i].PAYE = employees[i].grossSalary * 0.20;
        } else if (employees[i].grossSalary > 1000000) {
            employees[i].PAYE = employees[i].grossSalary * 0.30;
        } else {
            employees[i].PAYE = 0;
        }

        employees[i].netSalary = employees[i].grossSalary - (employees[i].PAYE + employees[i].SOSE);
    }
}

void PrintSlip(Employee employees[], int n) {
    for (int i = 0; i < n; i++) {
        cout << "\nEmployee " << i + 1 << ": " << employees[i].name << endl;
        cout << "Basic Salary: " << employees[i].basicSalary << endl;
        cout << "House Allowance (HA): " << employees[i].HA << endl;
        cout << "Lunch Allowance (LA): " << employees[i].LA << endl;
        cout << "Transport Allowance (TA): " << employees[i].TA << endl;
        cout << "Social Security (SOSE): " << employees[i].SOSE << endl;
        cout << "Gross Salary: " << employees[i].grossSalary << endl;
        cout << "Pay As You Earn (PAYE): " << employees[i].PAYE << endl;
        cout << "Net Salary: " << employees[i].netSalary << endl;
    }
}

int main() {
    const int numEmployees = 3; // Change to 100 for 100 employees
    Employee employees[numEmployees];

    PataData(employees, numEmployees);
    KokotoaMshahara(employees, numEmployees);
    PrintSlip(employees, numEmployees);

    return 0;
}
```

(b) Test your program for three employees and print a screen shot.
Solution: Run the above program, input details for three employees, and capture the output.

2. The National Electoral Commission (NEC) is facing difficulties in updating the voters' book, including new voters. However, the work plan is done manually, which hinders citizens to register online. Currently, the director has decided to establish an online form to solve this problem.

Solution:

```
<!DOCTYPE html>
<html>
<head>
  <title>Online Registration Form</title>
</head>
<body>
  <h1>Online Registration Form!!</h1>
  <form>
    <label for="idCode">National Identity Code:</label>
    <input type="text" id="idCode" name="idCode"><br><br>

    <label for="name">Name:</label>
    <input type="text" id="name" name="name"><br><br>

    <label for="birthdate">Birthdate:</label>
    <input type="date" id="birthdate" name="birthdate"><br><br>

    <label for="gender">Gender:</label><br>
    <input type="radio" id="male" name="gender" value="Male">
    <label for="male">Male</label><br>
    <input type="radio" id="female" name="gender" value="Female">
    <label for="female">Female</label><br><br>

    <label for="zone">Zone:</label>
    <select id="zone" name="zone">
      <option value="North">North</option>
      <option value="South">South</option>
      <option value="East">East</option>
      <option value="West">West</option>
    </select><br><br>

    <input type="submit" value="Submit">
  </form>
</body>
</html>
```

(b) Use JavaScript to activate the form created in Figure 1 in order to display the following messages in the message box:
- "Fill all blanks" if any text box is not filled.
- "You are not Tanzanian" if the entered National Identity Code is not 02551961.
- "Your age should be above 18" if the difference between entered year at the birthdate textbox and election year 2025 is less than 18.
- "Conglatulation! You have registered successful" if all details are filled as required. A form should also display "Your Voting Identification Code is T.xxxyyy" where xxx is the National Identity Code and yyy is the entered birthdate.

HINT: (Message should be displayed when a user clicks a Submit button).

Solution:

```
<!DOCTYPE html>
<html>
<head>
   <title>Online Registration Form</title>
   <script>
      function validateForm() {
         // Get form elements
         var idCode = document.getElementById("idCode").value;
         var name = document.getElementById("name").value;
         var birthdate = document.getElementById("birthdate").value;
         var gender = document.querySelector('input[name="gender"]:checked');
         var zone = document.getElementById("zone").value;

         // Check if any field is empty
         if (idCode === "" || name === "" || birthdate === "" || !gender || zone === "") {
            alert("Fill all blanks");
            return false;
         }

         // Check if the National Identity Code is valid
         if (idCode !== "02551961") {
            alert("You are not Tanzanian");
            return false;
         }

         // Check age
         var birthYear = new Date(birthdate).getFullYear();
         var currentYear = 2025;
```

```
        var age = currentYear - birthYear;
        if (age < 18) {
            alert("Your age should be above 18");
            return false;
        }

        // Success message
        var votingID = "T." + idCode + birthYear;
        alert("Conglatulation! You have registered successfully. Your Voting Identification Code is " +
votingID);
        return true;
    }
  </script>
</head>
<body>
  <h1>Online Registration Form!!</h1>
  <form onsubmit="return validateForm()">
    <label for="idCode">National Identity Code:</label>
    <input type="text" id="idCode" name="idCode"><br><br>

    <label for="name">Name:</label>
    <input type="text" id="name" name="name"><br><br>

    <label for="birthdate">Birthdate:</label>
    <input type="date" id="birthdate" name="birthdate"><br><br>

    <label for="gender">Gender:</label><br>
    <input type="radio" id="male" name="gender" value="Male">
    <label for="male">Male</label><br>
    <input type="radio" id="female" name="gender" value="Female">
    <label for="female">Female</label><br><br>

    <label for="zone">Zone:</label>
    <select id="zone" name="zone">
      <option value="">Select Zone</option>
      <option value="North">North</option>
      <option value="South">South</option>
      <option value="East">East</option>
      <option value="West">West</option>
    </select><br><br>

    <input type="submit" value="Submit">
  </form>
```

</body>
</html>

3. Students' academic records at Mapambano High School, which were stored in paper-based format, were burnt due to a fire accident a few weeks ago. As a result, the Headmaster recommended the deployment of a Computerized School Management System which will manage students' academic results as well as school events (Figure 2). You have been asked to develop a Visual Basic program which will accept student personal and academic particulars. The program then computes total, average, grade performance, and displays the list of student particulars in a grid view (Figure 3). Study Figure 2 carefully and answer the questions that follow:

(a) Create an interface form depicted in Figure 2.
(b) Create another two interface forms depicted in Figures 3 and 4.

(i) Use MS Access to create a database with the name "SchoolDb" then add the table named "StudentTbl" to store student results.
(ii) Set the textbox labeled "Average" to read numbers with two decimal places only.
(iii) Automate an Interface Form to display the total, average, and grade when the user clicks the corresponding textbox.
HINT: The Grade depends on the average marks obtained by the students as follows:
- If the average marks is greater or equal to 80, the grade is A.
- If the average marks is greater or equal to 60 but less than 80, the grade is B.
- If the average marks is greater or equal to 40 but less than 60, the grade is C.
- If the average marks is greater or equal to 20 but less than 40, the grade is D.
- Otherwise, the grade is F.
Solution:

(a) Create an interface form depicted in Figure 2

a sample VB.NET code for the form:

```
Public Class Form1
    Private Sub Form1_Load(sender As Object, e As EventArgs) Handles MyBase.Load
        ' Set default text for school events
        TextBoxEvents.Text = "School Baraza: Held on January 26 and July 10" & Environment.NewLine &
                             "Mapambano Day: Held on July 31" & Environment.NewLine &
                             "Teachers Meetings: Held on January 10 and July 15"

        ' Set school details
        LabelContact.Text = "P.O. Box 23099 Dar es Salaam"
        LabelCombination.Text = "PMC, PCM, PCB, CBG, HGL, HKL, EGM, and HGK"
    End Sub
```

```
    Private Sub ButtonResults_Click(sender As Object, e As EventArgs) Handles ButtonResults.Click
        ' Open the student results form
        Dim resultsForm As New Form2
        resultsForm.Show()
    End Sub
End Class
```

(b) Create another two interface forms depicted in Figures 3 and 4
sample VB.NET code for the form:

```vb.net
Public Class Form2
    Private Sub ButtonSubmit_Click(sender As Object, e As EventArgs) Handles ButtonSubmit.Click
        ' Get input values
        Dim studentNumber As String = TextBoxStudentNumber.Text
        Dim studentName As String = TextBoxStudentName.Text
        Dim subject1 As Double = CDbl(TextBoxSubject1.Text)
        Dim subject2 As Double = CDbl(TextBoxSubject2.Text)
        Dim subject3 As Double = CDbl(TextBoxSubject3.Text)
        Dim subject4 As Double = CDbl(TextBoxSubject4.Text)

        ' Calculate total, average, and grade
        Dim total As Double = subject1 + subject2 + subject3 + subject4
        Dim average As Double = total / 4
        Dim grade As String

        If average >= 80 Then
            grade = "A"
        ElseIf average >= 60 Then
            grade = "B"
        ElseIf average >= 40 Then
            grade = "C"
        ElseIf average >= 20 Then
            grade = "D"
        Else
            grade = "F"
        End If

        ' Display results
        TextBoxTotal.Text = total.ToString()
        TextBoxAverage.Text = average.ToString("F2")
        TextBoxGrade.Text = grade
```

```
        ' Add to DataGridView
        DataGridViewResults.Rows.Add(studentNumber, studentName, subject1, subject2, subject3, subject4, total, average, grade)
    End Sub
End Class
```

Database Creation with MS Access
1. Open MS Access and create a database named "SchoolDb".
2. Create a table named "StudentTbl" with the following fields:
  - StudentID (Primary Key)
  - StudentName
  - Subject1
  - Subject2
  - Subject3
  - Subject4
  - Total
  - Average
  - Grade

Steps to Set "Average" TextBox to Two Decimal Places
1. In the property window of the "Average" TextBox, set the `Format` property to "Fixed" and the `Decimal Places` property to "2".

Automate the Interface Form
The calculation logic provided in the VB.NET code automates the process of computing total, average, and grade when the Submit button is clicked. The grades are calculated based on the given grading criteria.

(c) Activate the "Student Results" button to behave as described.**

the button activation in Visual Basic:
1. Functionality for "Student Results" Button:
  - When the button is clicked, it asks whether the user is a teacher or a student.
  - If the user selects "Teacher," it opens the form shown in Figure 3 for managing results.
  - If the user selects "Student," it opens the form in Figure 4, allowing students to search their grade.

2. Steps to Implement in Visual Basic

```
Public Class Form1
    Private Sub ButtonResults_Click(sender As Object, e As EventArgs) Handles ButtonResults.Click
        ' Ask the user whether they are a teacher or student
        Dim userType As String = InputBox("Are you a Teacher or Student? (Type 'Teacher' or 'Student')", "User Type")

        If userType.ToLower() = "teacher" Then
```

```
        ' Open Form3 (for managing student results)
        Dim teacherForm As New Form3
        teacherForm.Show()
    ElseIf userType.ToLower() = "student" Then
        ' Open Form4 (for searching student grade)
        Dim studentForm As New Form4
        studentForm.Show()
    Else
        MessageBox.Show("Invalid input! Please type 'Teacher' or 'Student'.", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
    End If
  End Sub
End Class
```

(i) Form for Teachers (Figure 3)

(ii) Form for Students (Figure 4)

1. Design a form (`Form4`) with the following:
   - A TextBox for "Enter your number".
   - A Button labeled "Search".
   - A Label or TextBox for displaying the grade ("Your grade is").

2. Code to Search Student Grade:

```
Public Class Form4
  Private Sub ButtonSearch_Click(sender As Object, e As EventArgs) Handles ButtonSearch.Click
    ' Example data: Replace with database connection or dynamic data source
    Dim studentResults As New Dictionary(Of String, String) From {
        {"1001", "A"},
        {"1002", "D"},
        {"1003", "B"},
        {"1004", "C"}
    }
    ' Get the entered student number
    Dim studentNumber As String = TextBoxStudentNumber.Text

    ' Check if the student number exists in the results
    If studentResults.ContainsKey(studentNumber) Then
        LabelGrade.Text = "Your grade is: " & studentResults(studentNumber)
    Else
        MessageBox.Show("Student number not found!", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
    End If
```

```
    End Sub
End Class
```

Integration Workflow

1. The Form1 ("School Management System") is the main form with the "Student Results" button.
2. If the user selects "Teacher," the program opens Form3 for managing results.
3. If the user selects "Student," the program opens Form4 for searching grades.