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: 2021**

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) Differentiate utility software from operating system.

Utility software refers to programs designed to perform specific tasks that help manage and maintain a computer system, such as antivirus software, disk cleanup tools, or backup software. Operating system (OS) is a system software that manages hardware and software resources and provides common services for applications, such as Windows, macOS, or Linux.

(b) State four factors to be considered when choosing an operating system.

i. Compatibility: Ensure the operating system supports the hardware and software applications required.
ii. Cost: Consider the purchase, licensing, and maintenance costs associated with the operating system.
iii. User Interface: Evaluate the ease of use and learning curve of the operating system.
iv. Security Features: Assess the built-in security measures, such as firewalls and encryption support.

(c) Describe four functions of control unit in the Central Processing Unit (CPU).

i. Instruction Fetching: Retrieves instructions from memory and passes them to the CPU for execution.
ii. Instruction Decoding: Interprets instructions to determine the required operation.
iii. Data Control: Directs the flow of data between the CPU, memory, and input/output devices.
iv. Synchronization: Ensures that all CPU components work together in harmony by managing timing signals.

2. (a) Explain briefly the demodulation process.

Demodulation is the process of extracting the original information signal (such as voice or data) from a modulated carrier wave. It is performed by devices like demodulators or radio receivers.

(b) Briefly explain the following terms as used in data communication:

i. Bandwidth: The range of frequencies available for data transmission, determining the maximum data transfer rate.
ii. Baseband Signal: A signal that occupies the lowest frequency range and is not modulated for higher frequency transmission.
iii. Broadband Transmission: A method of transmitting multiple signals simultaneously using different frequency ranges over the same medium.
iv. Attenuation: The reduction in signal strength as it travels through a medium, such as a cable or air.

(c) With an example, describe three modes of data communication.
i. Simplex: Data flows in one direction only. Example: Keyboard to computer.
ii. Half-Duplex: Data flows in both directions, but only one direction at a time. Example: Walkie-talkies.
iii. Full-Duplex: Data flows in both directions simultaneously. Example: Telephone communication.

3. (a) Differentiate analogue from digital quantities.

Analogue quantities vary continuously and can take on any value within a range, such as temperature or sound waves. Digital quantities are discrete and represented using binary numbers (0s and 1s), such as computer data.

(b) Convert decimal number 30_{10} to binary form and then find the following:

Binary of 30: $30_{10} = 11110_2$
i. 1's complement: Flip the bits. $11110_2 = 00001_2$
ii. 2's complement: Add 1 to the 1's complement. $00001_2 + 1 = 00010_2$

(c) Perform the following subtraction operations using 2's complement. Express your answer in decimal numbering system.

i. 100.5_{10} - 50.75_{10}
Convert to binary, perform subtraction using 2's complement, and return the result to decimal: 49.75_{10}

ii. 10_{10} - 28_{10}
Convert to binary, perform subtraction using 2's complement, and return the result to decimal:
 -18_{10} .

4. (a) Differentiate public subprocedure from private subprocedure as applied in Visual Basic.

Public Subprocedure: Can be accessed and called by other parts of the program, such as forms or modules.
Private Subprocedure: Accessible only within the module or form in which it is defined.

(b) What will happen if the number of items exceeds the value that can be displayed in a ComboBox?
A scrollbar will appear to allow the user to navigate through the items.

(c) Explain three types of ComboBox styles.
i. Dropdown ComboBox: Displays a dropdown list, and users can either select an item or type a value.
ii. Simple ComboBox: Shows a list of items and a textbox permanently, without a dropdown.
iii. Dropdown List ComboBox: Displays a dropdown list, but users cannot type custom values.
(d) Read the following Visual Basic codes and answer the questions:

```vb
Private Sub cmdRemoveListItem_click ()
   If MyList.ListIndex > -1 Then
      MyList.RemoveItem MyList.ListIndex
   End If
End Sub
```

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i. What will ListIndex property do if there is no item selected in the list?
It will return -1, indicating no item is selected.

ii. Which type of event will cause the computer to execute codes above?
A click event on the cmdRemoveListItem button.

5. (a) What is a pointer?

A pointer is a variable in programming that stores the memory address of another variable. Instead of storing data directly, it "points" to the location in memory where the data is stored. Pointers are commonly used in languages like C and C++ for dynamic memory allocation, arrays, and data structure manipulation.

(b) State three advantages of a pointer.

i. Efficient Memory Management: Pointers allow dynamic allocation and deallocation of memory during runtime, optimizing the use of available memory.
ii. Access to Data Structures: Pointers enable the creation and manipulation of complex data structures like linked lists, trees, and graphs.
iii. Faster Array Access: Using pointers, arrays can be accessed more efficiently, especially in large data sets.

(c) Explain the advantage of dynamic data structure over static data structure in terms of size.

Dynamic data structures, such as linked lists, can grow or shrink at runtime as needed, offering flexibility and efficient memory usage. In contrast, static data structures, like arrays, have a fixed size that must be declared at compile time, which can lead to wasted memory if the size is overestimated or insufficient capacity if underestimated.

(d) Distinguish between the following statements as used in the pointer:

```cpp
int *ptr = new int(5);
int *ptr = new int[5];
```

i. `int *ptr = new int(5);` allocates memory for a single integer and initializes it to 5. The pointer `ptr` points to this single integer.
ii. `int *ptr = new int[5];` allocates memory for an array of five integers. The pointer `ptr` points to the first element of this array. The elements are uninitialized unless explicitly assigned values.

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6. (a) Briefly explain three basic HTML tags which are used together with `<table>` tag when creating tables.

i. `<tr>` (Table Row): Used to define a row within a table. It contains `<td>` or `<th>` tags to define the cells in that row.
ii. `<th>` (Table Header): Used to define the header cell in a table. It typically appears bold and centered by default.
iii. `<td>` (Table Data): Used to define a standard data cell in a table. It holds the actual content of the table.

(b) Write HTML codes which will display the following table:

```
<!DOCTYPE html>
<html>
<head>
  <title>Students' Information</title>
  <style>
    th {
      background-color: grey;
    }
  </style>
</head>
<body>
  <table border="1">
    <tr>
      <th colspan="4">Students' Information</th>
    </tr>
    <tr>
      <th>Name</th>
      <th>Reg Number</th>
      <th>Gender</th>
    </tr>
    <tr>
      <td>Changeme Panda</td>
      <td>T.2006.27</td>
      <td>Female</td>
    </tr>
    <tr>
      <td>Mabula Pembe</td>
      <td>T.2006.217</td>
      <td>Male</td>
    </tr>
  </table>
```

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```html
</body>
</html>
```

(c) With examples, explain three ways used to embed JavaScript into an HTML page.

i. Inline JavaScript: Adding JavaScript directly within an HTML element using the `onclick` or `onload` attributes.
Example:
```html
<button onclick="alert('Hello World')">Click Me</button>
```

ii. Internal JavaScript: Placing JavaScript code within a `<script>` tag inside the `<head>` or `<body>` section of an HTML document.
Example:
```html
<script>
    alert('Welcome to JavaScript!');
</script>
```

iii. External JavaScript: Linking to an external JavaScript file using the `<script>` tag with a `src` attribute.
Example:
```html
<script src="script.js"></script>
```

7. (a) With an example for each case, differentiate relational operator from logical operator as applied in C++ programming language.

Relational Operator: Compares two values and returns a boolean result. Example: `a > b` checks if `a` is greater than `b`.
Logical Operator: Combines two or more boolean expressions. Example: `(a > b) && (c < d)` checks if `a > b` and `c < d` are both true.
(b) With the aid of a syntax template (or general form), describe a `while` loop and a `do...while` loop.

`while` Loop: Repeatedly executes a block of code as long as the condition is true.
Syntax:
```cpp
while (condition) {
    // Code to execute
}
```

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`do...while` Loop: Executes a block of code at least once and then repeatedly as long as the condition is true.
Syntax:

```
do {
    // Code to execute
} while (condition);
```

(c) When the `while` and `do...while` loops are generally used?

`while` Loop: Used when the condition needs to be checked before executing the code block.
`do...while` Loop: Used when the code block must be executed at least once, regardless of the condition.

(d) What will the following C++ program give as output?

```cpp
#include <iostream>
using namespace std;
int main() {
    int i = 3, j;
    while (i) {
        cout << "i= " << i << ' ';
        for (j = 0; j < i; j++) {
            cout << "j= " << j << ' ';
        }
        cout << '\n';
        i--;
    }
    system("pause");
    return 0;
}
```

Output:

```
i= 3 j= 0 j= 1 j= 2
i= 2 j= 0 j= 1
i= 1 j= 0
```

8. Explain six ways in which ICT may affect human health, culture, and environment.

Impact on Health:
i. Eye Strain and Vision Problems: Prolonged screen time leads to Computer Vision Syndrome (CVS), causing headaches, dry eyes, and blurred vision.
ii. Repetitive Strain Injuries (RSI): Continuous use of keyboards and mice can cause wrist and hand injuries, such as carpal tunnel syndrome.
iii. Sleep Disruption: Blue light emitted by screens interferes with sleep cycles, causing insomnia.
Impact on Culture:
iv. Erosion of Traditional Practices: Increased access to global digital content leads to the adoption of foreign cultures, potentially eroding local traditions.
v. Digital Divide: Unequal access to ICT creates disparities between urban and rural areas, leading to social inequality.

Impact on Environment:
vi. E-Waste Accumulation: Obsolete electronic devices contribute to electronic waste, which contains hazardous materials harmful to the environment.

9. Analyze four advantages and two disadvantages a school would face from using Database Management System (DBMS).
Advantages:
i. Centralized Data Management: A DBMS centralizes data storage, reducing redundancy and inconsistency in school records.
ii. Enhanced Data Security: Schools can implement access controls to restrict unauthorized access to sensitive data.
iii. Easy Retrieval and Reporting: DBMS allows quick access to student records, grades, and attendance data for reporting purposes.
iv. Scalability: The system can grow with the institution, accommodating more data as the school expands.
Disadvantages:
i. High Cost: Implementing and maintaining a DBMS can be expensive for schools with limited budgets.
ii. Complex Maintenance: Requires skilled personnel to manage the system, which can be a challenge for resource-constrained institutions.

10. You have been asked to conduct training about the sources of computer damage to new staff employed by the Ministry of Education Science and Technology. Explain five possible sources that you will include in the presentation and give one preventive measure for each source.

Sources of Computer Damage and Preventive Measures:
i. Power Surges: Sudden increases in electrical voltage can damage internal components.
   Preventive Measure: Use surge protectors or Uninterruptible Power Supply (UPS) systems.

ii. Physical Impact: Dropping or mishandling computers can result in hardware damage.
   Preventive Measure: Handle devices with care and use protective cases.

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iii. Malware and Viruses: Malicious software can corrupt files or compromise system security.
   Preventive Measure: Install and regularly update antivirus software.

iv. Overheating: Poor ventilation or prolonged use can cause the system to overheat, damaging internal components.
   Preventive Measure: Ensure proper ventilation and use cooling pads.

v. Dust and Debris: Accumulation of dust inside the computer can block airflow and damage components.
   Preventive Measure: Clean the computer regularly and use dust covers when not in use.