

THE UNITED REPUBLIC OF TANZANIA

THE PRESIDENT'S OFFICE,  
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

FORM V      TERMINAL EXAMINATION

136/1

COMPUTER SCIENCE 1

TIME: 3:00Hours

November

**Instructions**

1. This paper consists of two sections **A** and **B** with total of **eleven (10)** questions.
2. Answer **ALL** questions in section A and choose only **two (2)** questions from section B.
3. Section A carries **seventy (70)** marks while section B carries **thirty (30)** marks.
4. Non-Programmable calculator may be used.
5. Cellular phones and any other unauthorized material are not allowed in the examination room.
6. All drawings must be in pencil and writings in blue or black ink.
7. Write your name on every paper/answer sheet you have used.

## SECTION A

1. (a). Differentiate source code from object code **4 marks**  
(b). Translators are programming language processors required to change a program into the languages which is understood by the processor. With the help of diagrams, describe three categories of translators. **6 marks**
2. (a). Convert the following numbers into binary numbers **4.5 marks**  
(i).  $(FACE)_{16}$                       (ii).  $(234.26)_8$                       (iii). 15  
(b). Write the decimal equivalent of the following signed integers **4 marks**  
(i)  $(01110001)_2$                       (ii)  $(10011000)_2$   
(c). Most of digital devices works with both negative and positive binary numbers as well as decimal numbers which are sometimes considered as floating-point number. Write three parts of the floating-point number. **1.5 marks**
3. (a). The program flowchart is the most convenient tool in program development than system flowchart. Give any two reasons. **2 marks**  
(b). Write an algorithm using pseudocode and flowchart that performs the following: Ask a user to enter a number. If the number is between 5 and 14, write the comment "AT PRIMARY SCHOOL". If the number is between 15 and 22, write the comment "AT SECONDARY SCHOOL". If the number is between 23 and 30, write the comment "IN UNIVERSITY". If the number is above 30 and less than 60, write "WORK HARD" otherwise, display "ENJOY YOUR LIFE". **8marks**
4. Read the following algorithm and then answer the questions that follows  

*Step 1: Start the program.*

*Step 2: Set the loop up to the size of an array. Then, use the loop to enter the marks of 10 candidates and calculate the sum of elements stored in an array.*

*Step 3: Calculate the average.*

*Step 4: Print the sum and average of the marks.*

*Step 5: Stop.*

  - (a) Draw a flow chart to represent the algorithm above. **5 marks**
  - (b) Write C++ program to implement the flowchart in (a) above. **5 marks**
5. (a). Explain why adders are important in a computer? **1 mark**  
(b). Draw a logic circuit for half adder and full adder. **3 marks**  
(c). Draw the truth table of the half adder. **2 marks**  
(d). From the truth table in c determine its Boolean expression **2 marks**

- (e). Use Booleans laws of algebra to show that;  
 $(A'B'C) + (A'BC) + (AB'C) + (ABC) = C$
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6. (a) Differentiate analogue from digital quantities. **2 marks**
- (b) Convert decimal number  $30_{10}$  to binary form and find the following: **2 marks**
- (i) 1's complement **2 marks**
- (ii) 2's complement **2 marks**
- (c) Perform the following subtraction operations using 2's complement. Express your answer in decimal numbering system.
- (i)  $100.5_{10} - 50.75_{10}$  **2 marks**
- (ii)  $10_{10} - 28_{10}$  **2 marks**

7. ABC Company Ltd wants to install an electric fence system to its customers. One of its logical circuits is derived from the Boolean expression

$$X = AB + ABC + A\bar{B}\bar{C} + A\bar{C}$$

- (a) Use Boolean laws of algebra to simplify the Boolean Expression X. **3 marks**
- (b) Draw the logic gate circuit for the expression obtained in (a). **3 marks**
- (d) Use a truth table to determine what input conditions produce logic 1 output in the logic gate drawn in (b) **4 marks**

**SECTION B** (Answer any **Two** Questions)

8. Study the following C++ program that prints one line of the text, then answer the questions which follow:

```
#include <iostream>
using namespace std;
int main (){
    int input;
    cin >> input;
    if (input < 11) {
        if (input != 6)
            cout <<"Wow - #";
        else
            input++;
    }
    else {
        if (input == 18)
            input += 11;
        else
            cout <<"Oyaaa!";
    }
    cout <<input<<"\n";
    return 0;
}
```

What will the program print if the user enters the following numbers as inputs?

- (a) 4      (b) 20 (c) 6 (d) 18 (e) -6

**10 marks**

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9. The problem is a kind of obstacle to accomplishing your goal, and that problem solving is a method of removing that obstacle through a series of activities.

Clearly explain the problem-solving process.

**10 marks**

10. A computer science student was assigned to create a program to help his teacher to produce annual students' reports. However, high levels of programming languages. Why was the student advised to use both programming languages? Give three points for each.

**10 marks**