Republic of Rwanda
City of Kigali

**GASABO DISTRICT COMPREHENSIVE ASSESSMENT**

**FOR 2ND TERM, ACADEMIC YEAR 2022-2023.**

**TRADES: (SOD, NET).**

**RTQF LEVEL: IV**

**SUBJECT: APPLY ALGORITHM FUNDAMENTALS**

**DURATION: 3hrs 0n ..... / ...../ 2023**

**INSTRUCTION TO CANDIDATES:**

- ✓This question paper consits of **THRE** sections **A, B and C**
- ✓Answer all questions in section A **( 55marks).**
- ✓Answer only **Three** questions in section B ( **30matks).**
- ✓Answer only **One** question in sectio C ( **15marks**).
- ✓Use only blue or black pen for answering.
- ✓Mathematical instruments are allowed where it is necessary.

**Note:** Results for any candidate who is caught in examination malpractices are nullified.

## SECTION A: ATTEMPT ALL QUESTIONS IN SECTION A /50 MARKS

**QUESTION 1:** **/5marks**

**a.** How can we define an array? Defend your answer

**A.** The Array shows a hierarchical structure.

**B.** Arrays are immutable.

**C.** Container that stores the elements of similar types

**D.** The Array is not a data structure

**b.** Why do we need to use arrays?

**QUESTION 2:** By using flowcharts, give the syntaxes of For, Do while and while loops. **/5marks**

**QUESTION 3:** Answer by true (T) or False (F) **/5marks**

- **Ambiguous:** Algorithm should not be clear and ambiguous. Each of its steps (or phases), and their inputs/outputs should not be clear and must lead to only one meaning.
- **Input:** An algorithm should not have 0 or more well-defined inputs.
- **Output:** An algorithm should have 1 or more well-defined outputs, and should match the desired output.
- **Finiteness:** Algorithms must not terminate after a finite number of steps.
- **Dependent:** An algorithm should not have step-by-step directions, which should be dependent of any programming code.

**QUESTION 4:** Different algorithms play different roles in programming. You only need to define your problem then select the right Algorithm to use. Outline three (3) main types of Algorithm. **/5marks**

**QUESTION 5**: Write an algorithm which receives a number and calculate its Factorial. (By Using For-loop) **/5marks**

**QUESTION 6**: Draw a flowchart to determine a student's final grade and Indicate whether it is passing or failing according to the marks Obtained in 4 subject. The pass marks should be 50 and above. **/5marks**

**QUESTION 7:** Discuss the **c**haracteristics of an **a**lgorithm. **/5marks**

**QUESTION 8**: Define the following terms: **/2.5marks**

- **a.** Algorithm
- **b.** Flowchart
- **c.** Variable
- **d.** Loop

**QUESTION 9**: What is "read" and "write" in algorithm? **/5marks**

**QUESTION 10**: Write a simple algorithm to divide two numbers ( num1 and num2 ) entered by the user. **/5marks**

**QUESTION 11:** A set of rules that step-by-step define how the work is to be executed upon in order to get the expected result is known as…… **/2.5marks**

**QUESTION 12:** Write an algorithm that solves the first order equation of the form **ax+b=0.**

Note: Analyze all cases. **/5marks**

**SECTION B: ATTEMPT 3 QUESTIONS IN SECTION B /30 MARKS**

**QUESTION 13**: **/10marks**

**a.** Write short note on switch statement.

**b.** Give the syntax of switch statement.

**QUESTION 14:** **/10marks**

**a.** List any five-logic gate by drawing its symbols.

**b.** Demonstrate by the truth table the following De Morgan theorems.

$$\overline{a+b} = \overline{a}.\overline{b}$$

**QUESTION 15:** **/10marks**

**a.** Write an algorithm and a flowchart that displays the message if the number given by a user is between 1 and 37.

**b.** Write an algorithm that allows the user to input a number and display the cube of that number till the user input the negative value.

**QUESTION 16:** Give the C program codes to display: **/10marks**

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**QUESTION 18:** Base conversion

**a.** Convert 100 110 000 from base 2 to base 8

**b.** Convert 643 from base 10 to binary

**c.** Convert 1010 0110 0110 0110 from base 2 to base 16

**d.** Convert B2A from base 16 to base 10

**e.** Convert ACB1 from Hexadecimal to Hexadecimal

**SECTION C: ATTEMPT ONLY ONE QUESTION IN SECTION C /15 MARKS**

**QUESTION 27:** Draw the flowchart of the following algorithm. **/15marks**

Step 1: Start
Step 2: Declare variables x,y and z.
Step 3: Read variables x,y and z.
Step 4: If y < x
    If z < x
        Display x is the largest number.
    Else
        Display z is the largest number.
  Else
    If z < y
        Display y is the largest number.
    Else
        Display z is the greatest number.
Step 5: Stop

**QUESTION 28:** Write an algorithm to solve the **quadratic equation** of the form ax^2+bx+c=0 or ax2+bx+c. **/15marks**