Republic of Rwanda
City of Kigali

GASABO DISTRICT

DISTRICT COMPREHENSIVE ASSESSMENT, RTQF LEVEL... 2023-2024

SECTOR: ICT AND MULTIMEDIA

TRADE: SOFTWARE DEVELOPMENT

MODULE CODE: SWDDA401

MODULE NAME: DATA STRUCTURE AND ALGORITHM FUNDAMENTALS BY USING JS

DATE OF EXAM: 12/03/2024

DURATION: 3 HOURS

SCHOOL YEAR: 2023-2024

TERM: 2

Instructions:

1. **Attempt all questions in section A** **(55 Marks)**
2. **Attempt three questions in section B** **(30 Marks)**
3. **Attempt one question in section C** **(15 Marks)**

SECTION ONE: ***Answer all questions 55Marks***

1. Define the following terms: **5marks**
   a. Algorithm
   b. Flowchart
   c. Leaf
   d. Edges
   e. Array
2. Convert $\mathbf{1101.101_2}$ into decimal system. **2Marks**
3. Draw the flowchart to show the use of for loop. **2Marks**
4. Differentiate while loop from do while loop **3Marks**
5. When an algorithm is written in the form of a programming language, it becomes a
   a) Flowchart **2Marks**
   b) Program
   c) Pseudo code
   d) Syntax
6. From the following sorting algorithms which algorithm needs the minimum number of swaps?
   a. Bubble sort
   b. Quick sort **2Marks**
   c. Merge sort
   d. Selection sort
7. From the following sorting algorithms which has the lowest worst case complexity?
   a. Bubble sort
   b. Quick sort **2Marks**
   c. Merge sort
   d. Selection sort
8. **A)** What do you understand 'Decision Making Statements'? **1marks**
   B) Why we use default and break in Switch case statement? **1Marks**

9. Demonstrate (show) by the truth table the following De Morgan theorems. **4Marks**

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

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

10. Write an algorithm which receives a number and informs the user whether it is positive or negative. **4Marks**

11. In data structure, there are two types of searching techniques. List and explain them**. 3Marks**

12. Write an algorithm to find the largest among three different numbers entered by user. **4Marks**

13. Using a while loop write algorithm to calculate and display the sum of numbers from 1 to 10. **4Marks**

14. a) Convert 620_{10} into hexadecimal **1Marks**

b) Convert 1110100110_2 into hexadecimal **1Marks**

c) Convert 111 110 000 from base 2 to base 8 **1Marks**

d) Convert 193 from base 10 to binary **1Marks**

15. Write an algorithm which receives student note and it displays the grade as follows: **4Marks**

Note form 16 and above: Grade A

Note 14-16 : Grade B

Note 12-14 : Grade C

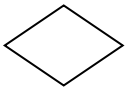
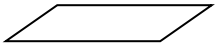
Note below 12 : Grade D

16. Explain the classification of data structure by using scheme? **4marks**

17. Write algorithm and the flowchart for the problem that allow the user to input three numbers and display the sum, the average and the product of them. **4Marks**

SECTION TWO: ***Choose Three Questions 30Marks***

18. Copy and complete the following table **10Marks**

Name of the symbol	**Diagram**	**Description**
oval	……	……
……	……	It is used for data processing
……		……
circle	……	……
……		…… ……

19. List any five-logic gate by drawing its symbols and truth table. **10Marks**

20. Describe five qualities of good algorithm **10Marks**

21. (a) List any five operators available in algorithm **5marks**

(b) What are the main difference between **primitive** and **non-primitive** data types? **5Marks**

22. Examine table below and Fill where it is necessary **(10marks)**

Parameter	Stack	Queue
Basics	It is a linear data structure. The objects are removed or inserted at the same end.	
Working Principle		It follows the First In, First Out (FIFO) principle.
Operations		Queue uses enqueue and dequeue as two of its operations.
Structure	Insertion and deletion of elements take place from one end only. It is called the top	

SECTION THREE: Choose One question 15Marks

23. Write an algorithm allows entering a number of students in a class and the marks obtained by those students, then calculate the sum of those marks and their average and display the number of students, the marks, sum and average on the screen. **15Marks**

24. A) After defining linked list Outline three types of linked list. **15Marks**

B) List any three Basic Operations from Linked List.

C) show how you can implement linked list by using JavaScript

END OF ASSESSMENT