# UGANDA MARTYRS UNIVERSITY
## NKOZI/ Rubaga

### UNIVERSITY EXAMINATIONS

### FACULTY OF SCIENCE

## DEPARTMENT OF COMPUTER SCIENCE & INFORMATION SYSTEMS

### SEMESTER I 2021-2022
### SECOND YEAR EXAMINATION FOR   BSC.IT, GEN, CS, EDUC
### PROGRAMMING DATA STRUCTURES AND ALGORITHMS
### CSC2101

DATE: 19th January 2022

TIME: 2.00 - 5.00 PM

DURATION: 3HRS

**Instructions:**

1. *Carefully read through ALL the questions before attempting*

2. *Answer any 10 Questions.*

3. *No **names** should be written anywhere on the examination book.*
4. *Ensure that your **Reg number** is indicated on all pages of the examination answer booklet.*
5. *Ensure your work is **clear** and **readable**. Untidy work shall be penalized*
6. *Any type of examination Malpractice will lead to automatic disqualification*
7. *Do not write anything on the question paper.*

**Question 1.**

Give the difference between the following basic data structure concepts
a) Data and a Data item
b) An elementary Data Item and a Group data item
c) Information and Data
d) A record and a file

(10 Marks)

**Question 2.**

Data structures are divided into two broad categories write briefly about any 5 data structures                                    (10 Marks)

**Question 3.**

Explain any five data structure operations.          (10 Marks)

**Question 4.**

a) What is an algorithm?          (1 Mark))

b) Write briefly about the three types of logic used while writing algorithms and their corresponding programs.          (9Marks)

**Question 5.**

Write an algorithm to insert an element 'MOSES' into a non-empty array EMPLOYEES containing N elements and capable of accommodating MX elements.
(10 Marks)

**Question 6.**

With clear examples explain the following notations used while writing expression.
a) Infix     b) Prefix   c) Postfix          (10 Marks)

**Question 7**

By inspection and hand translate the following expressions from infix to Prefix
a)     $a - y$     b) $8/4$   c) $r*w^q$          d) $(f * g) / m$          e) $S+K^W* B$
(10 Marks)

**Question 8**

a) With the help of a stack transform the following expression Q from Infix to its equivalent post fix expression   P

        Q:   30 / (5*3) +6          (6 Marks)
b) Evaluate   P   using a stack.          (4 Marks)

**Question 9**

a) Give the tree T representation of the following expression
   (A+B)  *  (D-K)
b) List all the left children in T          (3Marks)
c) List all the leaves in T          (2 Marks)
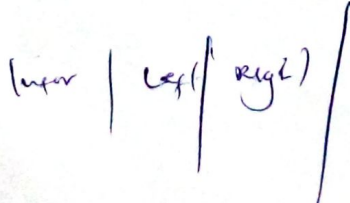d) Give the Link Representation  of T  or the Single array representation of T          (2 Marks)

**Question 10**

Given the following **expression** $(6 * 5 \uparrow (4 - 3)$
a) Give the tree T representation of the above expression          (6 Marks)
b) List all the descendants in T          (2 Marks)
c) Give the height of T.          (2 Marks)

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## Question11

Apply the bubble sort algorithm to the following array Marks with clear passes and comparisons.

| 60 | 50 | 90 | 70 | 80 |
|----|----|----|----|----|

*THE END*

1*fgm.

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Sequence logi