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

$(A+B) * (D-K)$ (3Marks)

b) List all the left children in T   (2 Marks)

c) List all the leaves in T   (2 Marks)

d) Give the Link Representation of T or the Single array representation of T

(3 Marks)

Question 10

Given the following **expression** $6 * 5 ^ 4 - 3$

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)

Question11

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

| 60 | 50 | 90 | 70 | 80 |

THE END