AFRICA UNIVERSITY
A United Methodist-Related Institution

COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NCSC 411: DATA STRUCTURES AND ALGORITHMS

END OF SECOND SEMESTER EXAMINATIONS

JULY 2022

LECTURER: DR. KANDIERO

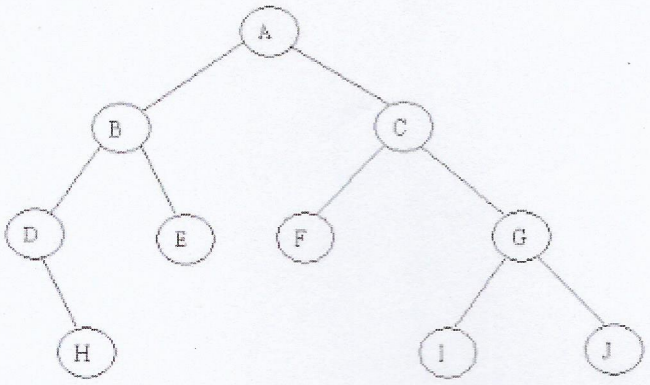
TIME: 3 HOURS

INSTRUCTIONS

1. Answer any ONE question.
2. Compile your answer into one consolidated PDF format document.
3. The file naming format is studentid_coursecode_surname
4. Answers to be presented in the sequence they are asked

QUESTION 1[100]

(a) Traverse the given tree using In- order, Preorder and Post order traversals. [15]



(b) Write an Algorithm to Calculate the fowling:

(i) Area of a Triangle. [10]

(ii) Area of a Circle. [10]

(iii) Area of a Rectangle. [10]

(c) Hence a write C programs to calculate the area of the above shapes (i) ,(ii) and (iii) [30]

(d) Write a C program to declare the following array called Age.

35	33	42	10	14	19	27	44	26	31

(e) Write Code snippet to find:

(i) The sum of all ages in the above array [5]

(ii) Average age . [5]

(iii) Highest age [5]

(iv) Lowest age [5]

(v) Print all the ages [5]

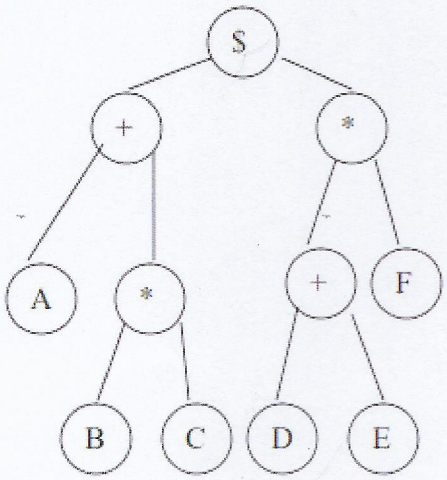
QUESTION 2 [100]

(a) A student form Africa University need to go to town from Campus to buy some stationary at Mutare Computers & stationary.

Write a detailed algorithm to show all the movements from campus up until the student gets back at campus. [20]

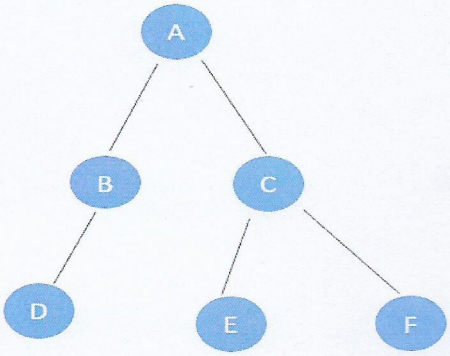
(b) Differentiate between an algorithm and Pseucode. [5]

(c) Define a is stack data structure. [2]
(d) Outline the operations that can be performed on a stacks. [10]
(e) Differentiate between ques and stack data structure [8]
(f) Explain three commonly used approaches to develop algorithms. [15]
(g) Differentiate an array data structure and a structure data type. [10]
(h) Traverse the following tree using
  (i) Pre-order [10]
  (j) In-order [10]
  (k) Post order [10]



QUESTION 3[100]

(a) Differentiate between DFS and BFS [8]



(b) Using the diagram below perform a:

(i) Breadth First Search [10]

(ii) Depth First Search [10]

(c) Declare a single dimension array called Mark to store 10 integers. [2]

(d) Using any loop write C program snippet to enter 10 ages into the array. [5]

(e) Declare a variable sum and use a loop to add all the ages stored in the age array [5]

(f) Write a code snippet to find the largest age and lowest age using a loop [10]

(g) Write a C code to calculate the average age stored in the array [5].

(h) Explain the differences between an array and a linked list [10]

(i) Write a C function to insert a node between two nodes of a singly linked list [10]

(j) Write a C function to delete a node at the beginning of a singly linked list [10]

(k) Explain any five operations that can be done on a linked list. [15]