



COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NCSC 411: DATA STRUCTURES AND ALGORITHMS

END OF SECOND SEMESTER EXAMINATIONS

APRIL 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
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QUESTION 1[100]

- a) Write a program in C to create and display Singly Linked List [50].

Test Data :

Input the number of nodes : 3

Input data for node 1 : 5

Input data for node 2 : 6

Input data for node 3 : 7

Expected Output :

- (a) Data entered in the list :
- (b) Data = 5
- (c) Data = 6
- (d) Data = 7

- b) Use flowcharts to illustrate your solution [50]

QUESTION 2 [100]

- (a) A student from Africa University needs to go to town from Campus to buy some stationery at Mutare Computers & stationery.

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 Pseudocode. [5]

- (c) Define a stack data structure. [2]

- (d) Outline the operations that can be performed on a stack. [10]

- (e) Differentiate between queue and stack data structure [8]

- (f) Explain three commonly used approaches to develop algorithms. [15]

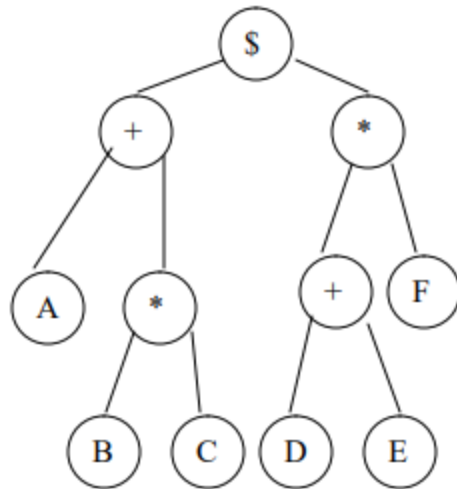
- (g) Differentiate an array data structure and a structure data type. [10]

- (h) Traverse the following tree using

- (i) Pre-order [10]

- (j) In-order [10]

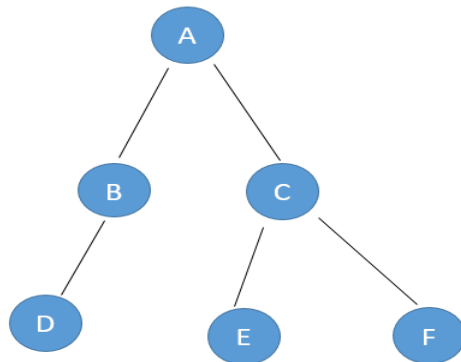
- (k) Post order [10]



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]

QUESTION 4 [100]

a) Write a program in C to store elements in an array and print it. [50]

Test Data :

Input 10 elements in the array :

element - 0 : 1

element - 1 : 1

element - 2 : 2

.....

Expected Output :

Elements in array are: 1 1 2 3 4 5 6 7 8 9

b) Use a flowchart to illustrate your solution [50]

END OF PAPER