CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COSC 325: DATA STRUCTURES

STREAMS: BSC. COMP. SCI (Y2S1) **TIME: 2 HOURS**

DAY/DATE: TUESDAY 23/03/2021 **2.30 P.M. – 4.30 P.M**

INSTRUCTIONS

- Attempt **question ONE (Section A)** and any other **TWO** from **Section B**
- Marks are awarded for clear and concise answers

SECTION A-COMPULSORY

QUESTION ONE [30 MARKS]

(a) Describe **TWO** methods used to represent 2- dimensional arrays in memory **[4 Marks]**

(b) Give **TWO** applications of graphs **[2 Marks]**

(c) Describe **FOUR** desirable features of an algorithm **[4 Marks]**

(d) While giving relevant examples, differentiate between:

(i) Array and linked list **[4 Marks]**

(ii) Abstract data type and data structure **[4 Marks]**

(iii) Pop and Push operations in a stack **[4 Marks]**

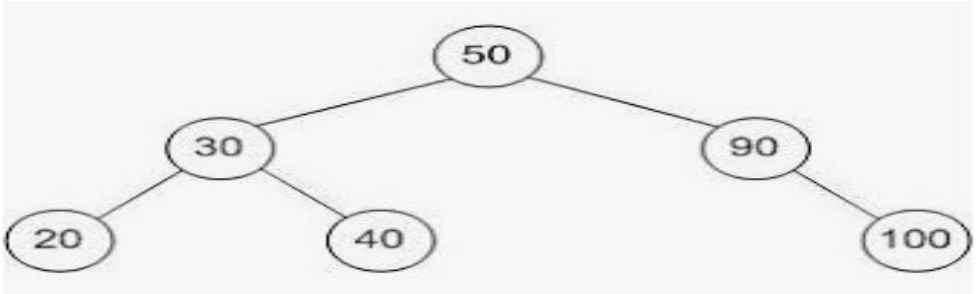
(e) Describe **FOUR** basic operations supported by an array **[4 Marks]**

(f) Distinguish between Enqueue and Dequeue operations supported by a Queue **[4 Marks]**

SECTION B- ANSWER ANY TWO QUESTIONS

QUESTION TWO [20 MARKS]

(a) Study the tree shown below and then answer questions that follow:



(i) List the root and all the leaves in the tree **[4 Marks]**

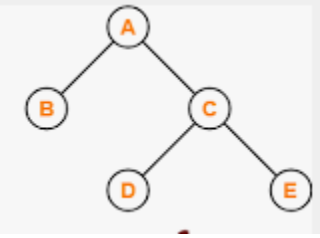
(ii) Using the tree data, construct a heap tree **[6 Marks]**

(b) Using the data **50,10,40,20,** construct Huffman tree: **[10 Marks]**

QUESTION THREE [20 MARKS]

Using the binary tree below,

(i) Illustrate how the nodes are stored in memory using pointers **[5 Marks]**



(ii) Show the order of how the nodes will be visited in:

(a) In-order traversal **[5 Marks]**
(b) Pre-order traversal **[5 Marks]**
(c) Post order traversal **[5 Marks]**

QUESTION FOUR [20 MARKS]

(a) Given the following set of data: **44, 47, 36 and 27**.Sort the data using Bubble Sort **[10 Marks]**

(b) Consider a 3 x 4 array that stores certain data. Illustrate how this data is represented/organized in memory if the programming language stores data in:

(i) Column major order **[5 Marks]**

(ii) Row major order **[5 Marks]**

QUESTION FIVE [20 MARKS]

(a) Using the data: **55, 77, 23, 48, 69, 80, 39, 99,** construct an appropriate hash table using the hashing function **Data mod 8** **[10 Marks]**

(b) Using the graph below, construct adjacency matrix **[10 Marks]**