

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COSC 325: DATA STRUCTURES AND ALGORITHMS

STREAMS: Y3S1

TIME:2 HOURS

DAY/DATE: TUESDAY 3/12/2019

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)Give **THREE** applications of graphs [3 Marks]

(b)Using a flow-chart, illustrate the algorithm for inserting a new node into a linked

List [4 Marks]

(c)Under what circumstances would a programmer prefer:

(i)Graph over tree [4 Marks]

(ii)Queue over stack [4 Marks]

(d)Differentiate between:

(i)Abstract data type and data structure [2 Marks]

(ii)Enqueue and Dequeue operations in a queue [2 Marks]

(e)Convert 264 in decimal to its binary equivalent using a stack [5 Marks]

(f)What are the key differences between a linked list and array in relation to the following:

(i)Dynamism [2 Marks]

(ii)Insertions [2 Marks]

(iii)Deletions [2 Marks]

SECTION B- Answer any TWO questions

Question TWO [20 Marks]

Using the following data: **70, 60, 50, 40, 30, 20 and 65**. Construct the following structures.

(i) A balanced binary search tree with 50 as the root node [10 marks]

(ii) An Huffman tree [10 Marks]

Question THREE [20 Marks]

(a)A linked list is a series of connected nodes. We use two classes: **Node** and **List** when implementing a linked list. Declare these classes.

(i)Node [4 Marks]

(ii)List [6 Marks]

(b)Use the graph below to answer the questions that follow:

(i) Construct adjacency matrix [5 Marks]

(ii)Adjacency Multilist [5 Marks]

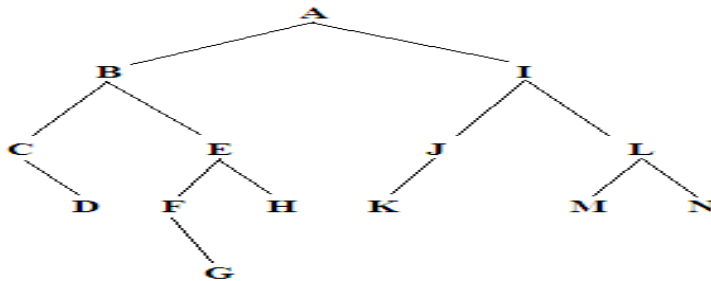
Question FOUR [20 Marks]

Given the following set of data: 86, 57, 74 and 35, illustrate how you would sort the data using:

- (i)Bubble Sort [5 marks]
- (ii)Merge Sort [5 Marks]
- (iii)Quick Sort [5 Marks]
- (iv)Selection Sort [5 Marks]

Question FIVE [20 Marks]

(a)Study the tree shown below and provide the results of each traversal method indicated.



- (i) Preorder Traversal [4 Marks]
- (ii) Inorder Traversal [4 Marks]
- (iii)Postorder Traversal [4 Marks]

(b)Using the following data: **32, 67, 53,45,76,47**, construct an appropriate hash table using the key **data mod 8 [4 Marks]**

- (a) Describe **FOUR** operations that can be performed on linked lists [4 Marks]
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