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UNIVERSITY OF KABIANGA

UNIVERSITY EXAMINATIONS 2017/2018 ACADEMIC YEAR THIRD YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE IN BACHELOR OF INFORMATION SCIENCE AND KNOWLEDGE MANAGEMENT

COURSE CODE: ISK 343

COURSE TITLE: DATA STRUCTURES AND ALGORITHMS

DATE: 29TH JANUARY, 2018

TIME: 9.00 A.M - 12.00 NOON

INSTRUCTIONS TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF (4) PRINTED PAGES

PLEASE TURN OVER

TOWN CAMPUS

KABIANGA UNIVERSITY
ISK 343: DATA STRUCTURES AND ALGORITHMS
MAIN EXAM PAPER

DATE: DECEMBER 2017

TIME: 2 HOURS

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND
ANY OTHER TWO QUESTIONS.**

QUESTION ONE (30 MARKS)

- (a) Discuss the following terms [4 marks]
- i. Data structure.
 - ii. Elementary Items
 - iii. Entity Set
 - iv. Field
- (b) Distinguish between enqueue and dequeue as used in data structures. (4 marks)
- c) Explain the meaning of the following terms as used in arrays. (4 marks)
- i. Element
 - ii. Index
- d) Discuss three characteristics of data structures. [6 marks]
- d) Outline the importance of Data structures in the modern world (6 marks)
- e) i) Explain the meaning of Linear search in data structures. (2 marks)
- ii) Write down an algorithm to demonstrate how linear search is used. (4 marks)

QUESTION TWO (20 marks)

- a) Discuss six categories of algorithms found in data structures. (6 marks)
- b) Explain two types of measures used to determine the efficiency of an algorithm. (3 marks)
- c) Describe any four sorting algorithms in data structures. [8 marks]
- d) Using examples, distinguish between the following types of Link Lists (3marks)
- i. Simple Linked List .
 - ii. Doubly Linked List
 - iii. Circular Linked List

QUESTION THREE (20 marks)

a) Explain the meaning of the following notations as used in Data structures and Algorithms? (6 marks)

- i. Big Oh Notation, O
- ii. Omega Notation, Ω
- iii. Theta Notation, θ

b) Discuss "Divide and Conquer" approach used to arrive at optimum solutions to problems in data structures and algorithms (4 marks)

c) Explain the pop and push operations in a stack data structure. (5 marks)

d) Compare and contrast between BFS and DFS in tree traversals. [5marks]

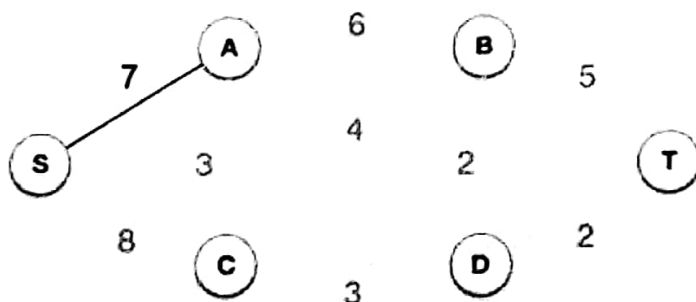
QUESTION FOUR (20 marks)

a) Discuss two benefits of using arrays in data structures. (2 marks)

b) Explain the following terms associated with trees in data structures (6 marks).

- i. Path
- ii. Root
- iii. Parent
- iv. Child
- v. Leaf
- vi. Subtree.

c) Find the minimum cost in the diagram below using Prim's spanning Tree algorithm. (7 marks)



d) Using a Java template, describe an algorithm. [5 marks]

QUESTION FIVE (20 marks)

- i. Differentiate between In-place sorting and Not in- place sorting (4 marks)
- a) Discuss any four attributes of a good program algorithm. [4marks]
- b) Explain the following terms as used in Linked Lists (4 marks)
 - i. Link
 - ii. Next
- c) Write Java codes that define a Linked list data structure shown below, the LinkedList should print the elements as described. Elements (F,B,D,E,C). The data structure should add element A at the beginning of the list and element Z at the end of the list. (8 marks)