

**W1-2-60-1-6**

## JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS 2018/2019**

**YEAR 2 SEMESTER 2 SPECIAL/SUPPLEMENTARY EXAMINATIONS FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

**ICS 2105: DATA STRUCTURES AND ALGORITHMS**

**DATE: MARCH 2019 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

QUESTION ONE

a) Define the following terms: (4 marks)

i) Data structures

ii) Encapsulation

iii) Queue

iv) Abstract Data Type (ADT)

b) A good programmer must be able to conceptualize a problem. This he can put down as an algorithm. Algorithms can be expressed in terms of pseudo codes or flowcharts.

i) Highlight any four properties of an algorithm (4 marks)

ii) Justify any three reasons why analysis of algorithms is important (3 marks)

iii) What is the difference between a recursion and iteration in program development? Use a high level language examples to make your point clear (4 marks)

iv) What is the Big Oh Notation (2 marks)

ci) Name one disadvantage of Binary Tree Data Structure (1 mark)

ii) List any two conditions that should be satisfied when an array type is appropriate for representing an abstract data type (2 marks)

d) Searching algorithms are used to read a particular record from a collection of records, write algorithms to demonstrate the following searching techniques.

i) Selection sort algorithm (4 marks)

ii) Bubble sort (4 marks)

iii) Stat the most efficient of the two algorithms, justify your answer (2 marks)

QUESTION TWO

ai) What is a linked list? Explain (2 marks)

ii) Outline the properties of the linked list abstract data type (4 marks)

iii) Write an algorithm used to delete an element from a list (6 marks)

bi) Write a pseudo code algorithm that prompts the user for three integers, evaluates the largest and print’s the maximum (4 marks)

ii) Implement the algorithm above into a program using a high level language (4 marks)

QUESTION FOUR

ai) Define a stack ADT (2 marks)

ii) Write an algorithm that demonstrates the push and pop stack fundamental operations

(8 marks)

iii) Briefly explain any two application of stack in computer science (4 marks)

bi) Define the term Abstract Data Type (ADT) and hence give its properties (6 marks)

QUESTION FIVE

a) Give tow properties that a liner must adhere to (2 marks)

b) Write an algorithm that explains a linear list insertion (8 marks)

c) Write an algorithm that explain the pop and push operations in a stack (8 marks)

d) Write an illustration differentiate between a doubly linked list and a circular list (2 marks)