

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

## JOMO KENYATTA UNIVERSITY

**OF AGRICULTURE AND TECHNOLOGY**

# University Examinations 2016/2017

**EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

**ICS 2105: DATA STRUCTURES AND ALGORITHMS**

**DATE: APRIL 2017 TIME: 2 HOURS**

**INSTRUCTIONS:**

1) This paper contains five (5) questions

2) Answer question one (compulsory) and any other two questions

**QUESTION ONE (30 MARKS)**

a) Explain how the following concepts are applied in data structure

(4 marks)

i) Atomic

ii) Traceable

iii) Accurate

iv) Clear and concise

b) With examples in each, explain two data types (4 marks)

c) Explain four operations supported by an array (4 marks)

d) Discuss three operations in a graph data structure (3 marks)

e) Evaluate four kinds of rotations an AVL tree may perform (4 marks)

f) Differentiate between the following sorting techniques (6 marks)

i) In-place sorting and Not-in-place

ii) Stable and Not stable sorting

iii) Adaptive and Non-Adaptive sorting Algorithm

g) Discriminate between Precedence and Associativity (3 marks)

h) Discuss three applications of spanning trees (3 marks)

**QUESTION TWO**

a) Using an illustration, explain a doubly linked list (6 marks)

b) Explain how the binary search can be used to locate value 31 in the array below (8 marks)

10 14 19 26 27 31 33 35 42 44

c) Explain Kruskal’s algorithm and how it works (6 marks)

**QUESTION THREE**

a) Use a well labeled diagram to explain the operations of a stack

(6 marks)

b) Using an illustration, explain the Dequeue operation (6 marks)

c) Discuss three tree traversal methods (6 marks)

d) Explicate a spanning tree (2 marks)

**QUESTION FOUR**

a) With an example for each, discuss the following notations (6 marks)

i) Infix notation

ii) Prefix notation

iii) Postfix notation

b) Explain how to enqueue data into a queue (4 marks)

c) Explain how you can mitigate reference counting (6 marks)

d) Discuss how objects can be reachable (4 marks)

**QUESTION FIVE**

a) Discuss four memory management techniques (8 marks)

b) Write a recursive algorithm (2 marks)

c) Use a diagram each explaining the following graph tranversal methods

i) Depth First Traversal

ii) Breath First Traversal

d) Discuss the two partitions of main memory (4 marks)