

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

## JOMO KENYATTA UNIVERSITY

**OF**

**AGRICULTURE AND TECHNOLOGY**

# University Examinations 2018/2019

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

**ICS 2301 : DESIGN AND ANALYSIS OF ALGORITHMS**

**DATE: APRIL 2019 TIME: 2 HOURS**

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

**TWO QUESTIONS.**

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**QUESTION ONE (30 MARKS)**

(a) (i) Explain the relationship between Mathematics and Computing. [4 marks]

(ii) Differentiate between Divide and Conquer and Dynamic Algorithms. [4 marks]

(iii) Determine the Running Time for the program given below: [3 marks]

for (int i=0;i<N;i++){

control.write (‘Hello world!’)”

}

(b) (i) Explain the types of solutions that can be provided by greedy Algorithms.

[4 marks]

(ii) Explain the different techniques used to represent Graphs in programs.

[4 marks]

(iii) Using Big Oh notation, evaluate the following, giving a reason for your answer.

[3 marks]

**PROOF READER: FOLLOWING IS MISSING**

(c) (i) Differentiate between the performance and efficiency of a given algorithm.

[4 marks]

(ii) Explain the accounting method as used in Amortized Analysis. [4 marks]

**QUESTION TWO (20 MARKS)**

(a) Explain any two advantages and a disadvantage of the greedy algorithms. [6 marks]

(b) For the graph below, determine the short test path from source node A using Djikstra’s algorithm. [10 marks]

(c) Explain how greed algorithms can be used in counting of money. [4 marks]

**QUESTION THREE (20 MARKS)**

(a) Explain the experimental study as an approach in analysis of the Running Time of an algorithm. [10 marks]

(b) Expound on any five application areas of Randomization in computing. [10 marks]

**QUESTION FOUR (20 MARKS)**

(a) Given the array of 5 numbers {25, 31, 42, 71, 105} and you are to find any element in the list. Use the array to find any element in the list. Use the array to differentiate between the best and worst case analysis of algorithms. [6 marks]

(b) Differences between the tree and graph data structures in regard to Root Nodes Parent-child relationship, complexity and applications. [8 marks]

(c) Using an example, explain the brute force string matching algorithm and give its pseudo code. [6 marks]

**QUESTION FIVE (20 MARKS)**

(a) With the aid of an example, explain Minimum Spanning trees as used in the graph data structure, giving its application areas. [10 marks]

(b) Explain any five application areas of the Stack Data structure. [10 marks]