



# **MAASAI MARA UNIVERSITY**

**REGULAR UNIVERSITY EXAMINATIONS  
2022/2023 ACADEMIC YEAR  
THIRD YEAR FIRST SEMESTER**

**SCHOOL OF PURE APPLIED AND HEALTH  
SCIENCES**

**BACHELOR OF SCIENCE (COMPUTER SCIENCE)**

**COURSE CODE: COM 3106  
COURSE TITLE: DESIGN AND ANALYSIS OF  
ALGORITHMS**

**DATE: 31<sup>ST</sup> MARCH 2022**

**TIME: 8:30AM-10:30AM**

**INSTRUCTIONS**

- Answer Question ONE and any other TWO

## **SECTION A**

### **QUESTION ONE (COMPULSORY 30 MARKS)**

- a) Illustrate how divide and conquer algorithm works using a well labelled diagram **[5 Marks]**
- b) Draw a state space tree to demonstrate breadth first search in branch and bound algorithm **[5 Marks]**
- c) Outline differences between linked data structures and array data structures **[4 marks]**
- d) Discuss differences between stack and queue operations **[6 Marks]**
- e) Design an algorithm to add two numbers and display results **[6 Marks]**
- f) Discuss differences between time and space complexity **[4 Marks]**

## **SECTION B**

### **QUESTION TWO**

- a) Draw a flowchart diagram for an algorithm which finds a greater number between three numbers **[10 Marks]**
- b) Discuss six characteristics of an algorithm **[6 Marks]**
- c) Discuss differences between priori and posterior analysis **[4 Marks]**

### **QUESTION THREE**

- a) Demonstrate how hashing convert a range of key values into a range of indexes of an array **[10 Marks]**
- b) Write a pseudo code to perform a binary search of a sorted array **[10 Marks]**

### **QUESTION FOUR**

- a) Discuss differences between Branch & bound and Backtracking algorithms **[10 Marks]**
- b) Discuss the procedure of sorting an array using Merge sort algorithm **[4 Marks]**
- c) Discuss three asymptotic notations as used in algorithms **[6 Marks]**

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