# KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

Date: 28th July, 2022
Time: 8.30am –10.30am

## KBI 2104 - THEORY OF ALGORITHMS

**INSTRUCTIONS TO CANDIDATES**

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

**QUESTION ONE (30 MARKS)**

a) Explain the following terms

   i) Algorithms

   ii) Bubble sort

   iii) Cyclic structure

   iv) Data Abstraction

   (8 marks)

b) Show any five conventions of pseudo code algorithm specifications.

   (5Marks)

c) Why are arrays preferred over Single linked lists?

   (5Marks)

d) State how circular queues help in overcoming the problems of a linear queue

   (4Marks)

e) Explain how you would compute the time complexity of a divide and conquer algorithm

   (3Marks)

f) Perform sort the array given using the straight selection sort

| 30 | 20 | 8 | 5 | 10 |
|----|----|---|---|----|

   (5Marks)

**QUESTION TWO (20MARKS)**

a) Outline the workings of the bubble sort algorithm and application in real life situations

   (10 marks)

b) What is the difference between a QUEUE search and a binary search

   (5 marks)

c) Discuss the greedy algorithm and highlight benefits                    (5 marks)

## QUESTION THREE 20MARKS)

a)   Perform selection sort on the array below explaining your operations.

| 2 | 25 | 78 | 68 | 94 | 47 | 35 | 13 |
|---|----|----|----|----|----|----|----|

(10 marks)

b)   What is the difference between a linear search and a binary search

(5 marks)

b)   Discuss the greedy algorithm.

(5 marks)

## QUESTION FOUR  (20MARKS)

a)   Using diagrammatic illustration, explain the **Best Search Tree Property** concept.

(5 marks)

b)   i)    Explain the term the concept of **heap property** .use illustration.

(5 marks)

ii)   Map the array given below into heap and determine if it has the heap property.

| 80 | 60 | 73 | 35 | 40 | 50 | 70 | 30 | 20 | 39 |
|----|----|----|----|----|----|----|----|----|----|

(5 marks)

iii)  Insert element 72 into the heap you have generated in

(5 mark)

## QUESTION FIVE (20MARKS)

a)   i)    Explain how *straight selection sort* works.

(5marks)

ii)    Perform sort the array given using the *straight selection sort*

| 30 | 20 | 8 | 5 | 10 |
|----|----|---|---|----|

(10 marks)

b)   Explain data encapsulation and state two of its benefits.

(5 marks)