



Kasarani Campus  
Off Thika Road  
Tel. 2042692 / 3  
P. O. Box 49274, 00100  
NAIROBI  
Westlands Campus  
Pamstech House  
Woodvale Grove  
Tel. 4442212  
Fax: 4444175

**KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR**  
**FIRST YEAR, FIRST SEMESTER EXAMINATION**  
**FOR THE BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**  
**KBI 2104 – THEORY OF ALGORITHMS**

Date: 07<sup>TH</sup> December 2023  
Time: 2:30PM – 4:30PM

**INSTRUCTIONS TO CANDIDATES**

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

**QUESTION ONE (30 MARKS)**

- a) Explain any two techniques used to search for an item in a data structure (4 Marks)
- b) Using 4 relevant examples, explain the different types of algorithms used in organisations (4 Marks)
- c) Write a C program that will add 4 numbers (5 Marks)
- d) State FOUR reason why bubble sort is often used by programmers (4 Marks)
- e) For each of the following situations, which of these Abstract Data Types (1 through 3) would be most appropriate in software development. Explain your answer using three relevant examples.
  - i) A queue (3 Marks)
  - ii) A stack (3 Marks)
  - iii) A list (3 Marks)
- f) Yegon is the information technology manager of Rolex enterprise that specializes in manufacturing of watches. Describe how he would use algorithms to improve efficiency in his business. (4 Marks)

**QUESTION TWO (20 MARKS)**

- a) Construct a binary tree by inserting the following new elements F, B, C, H, A, G, D the keys should remain properly ordered. Assume the tree is initially empty. (5 Marks)
- b) Kiriri Women's University of Science and Technology is developing an e- learning platform. The platform will enable lecturers to post class notes week by week, announcements and engage in discussion groups and chats with the students.
  - i. Using Five relevant examples, explain how the choice of data structures and algorithms will impact the performance of the e learning platform. (5 Marks)
  - ii. Discuss Four potential disadvantages of using inappropriate data structures or algorithms. (4 Marks)
  - iii. Using 4 relevant examples, explain 4 benefits that the students will experience through use of the e learning platform (4 Marks)
  - iv. Using 2 examples, explain how a binary tree can be used to optimize memory in the e-learning platform. (2 Marks)

**QUESTION THREE (20 MARKS)**

1. Waymaz Corporation is developing an Employee Performance Evaluation System to assess and track employee performance.
  - a) Using relevant examples, discuss 5 disadvantages of using linked lists in the Employee Performance Evaluation System at Waymaz Corporation. (5 Marks)

- b) Discuss the functionality and use of linked lists in the Employee Performance Evaluation System (5 Marks)
2. Mercy is a software engineer for Beba Pay travel company. She is developing a cashless payment system that will enable transport operators to run their business effectively.
- a) Using relevant examples discuss Four factors of algorithms that she should consider as she develops an efficient system. (4 Marks)
- b) Using Four relevant examples discuss how heaps and hash tables would be used by Mercy as she develops the cashless payment system (4 Marks)
- c) Explain two uses of a queue as used in data structure (2 Marks)

#### **QUESTION FOUR (20 MARKS)**

- a) You have been hired as the Information Technology manager by Amazon Limited. Using 5 relevant examples, discuss how you would use algorithms to predict user engagement with the content uploaded. (5 Marks)
- b) Using a well labeled diagrams, illustrate 4 symbols used in flow charts (4 Marks)
- c) Given three assignment Marks out of 50,20 and 70. Write an algorithm to calculate the average of the Marks out of 100. (5 Marks)
- d) Using 4 relevant examples, discuss any Four sorting techniques. (4 Marks)
- e) Discuss any 2 characteristics of an algorithm (2 Marks)

#### **QUESTION FIVE (20 MARKS)**

You are the Information Technology manager of Johnson Retail Enterprise, which is a leading chain of retail stores with multiple locations. The retail store would like to improve their inventory management system.

- a) Discuss the advantages of using arrays in the inventory management system of ABC Retail. (5 Marks)
- b) Discuss how Johnson Retail Enterprise can effectively use arrays in their employee scheduling process. (5 Marks)
- c) Using 2 relevant examples, discuss the challenges that you would face while implementing the inventory management system. (4 Marks)
- d) Using relevant examples, explain 4 disadvantages of using an algorithm in a business. (4 Marks)
- e) Using two examples, explain how arrays can be used to analyze data for Johnson Retail Enterprise (2 Marks)