



Kasarani Campus

Off Thika Road
Tel. 2042692 / 3

O. Box 49274, 00100

NAIROBI

Westlands Campus
Pamstech House
Woodvale Grove
Tel. 4442212
Fax: 4444175

P.

KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
SECOND YEAR, FIRST SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE
KCS 204 – DATA STRUCTURES AND ALGORITHMS

Date: 11TH AUGUST 2023

Time: 8:30AM – 10:30AM

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 four 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)

- Marks)
- ii) Discuss Four potential disadvantages of using inappropriate data structures or algorithms. (4 Marks)
- iii) Using four relevant examples, explain 4 benefits that the students will experience through use of the e learning platform (4 Marks)
- iv) Using two 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 five 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 **Four** relevant examples, discuss any Four sorting techniques. (4 Marks)
- e) Discuss any **Two** 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)