DATA Structure AND Algorithms

Bsc. mathematics and computer science (Jomo Kenyatta University of Agriculture and Technology)

W1-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS 2021/2022

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE

OF

MATHS AND COMPUTER SCIENCE

ICS 2105: D.ATA STRUCTURE AND ALGORITHMS

DATE: APRIL 2022 TIME: 2 HOURS

INSTRUCTIONS:

1. Answer question ONE (section A) and any other two questions in section B.
2. All questions except question one carry equal marks

SECTION A (30 MARKS)

QUESTION 1

a. Discuss the term Algorithm, state and explain the elements. **(7 Marks)**

b. Explain the Queue concept of abstract datatype. **(6 Marks)**

c. Set is defined as an unordered collection of values where each value occurs at most once. A group of elements with three properties: (1) all elements belong to a *universe*, (2) either each element is a *member* of the set or it is not, and (3) the elements are unordered.

State the axiomatic semantics (code) representation of the same. **(10 marks)**

d. Explain the difference between active and passive data structures using the queue concept. **(7 marks)**

SECTION B (20 MARKS EACH)

Q2

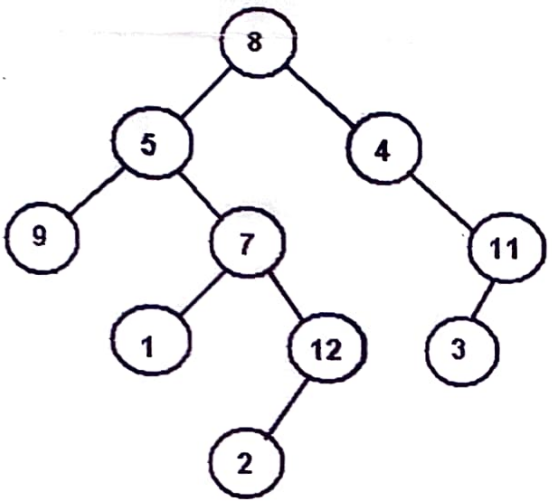
a. With the help of a suitable diagram, outline the binary trees concept of data structure. **(7 marks)**

b. Explain the term Abstract Data types and outline any two types. **(7marks)**

c. Explain the term List in reference to data structure. **(6marks)**

Q 3

a. Consider the following tree and explian the four traversals.



(8Marks)

b. Explain the meaning of recursive data structure. **(6 marks)**

c. Outline the three basic classes of structural elements of algorithms. **(6marks)**

Q 4

a. With a suitable diagram explain the term complete binary tree. **(7 Marks)**

b. Explain the meaning of traversals and state the three types . **(8 Marks)**

c. Explain the meaning of a full binary tree using a diagram. **(5 marks)**