



**Question 1**

Differentiate between the following, where appropriate state where they can be applied in computer programming:

- a) Singly linked and doubly linked list. (5 marks)
- b) Queue and stack. (5 marks)
- c) Single and multimedia array (5 marks)
- d) Dynamic and static data structure. (5 marks)

**Total marks 20**

**Question 2**

- a) Explain the importance of arrays in programming. (3 marks)
- b) Write a function to define an array of 5 character nodes. (3 marks)
- c) Define the following binary tree terminologies.
  - i) Root node (2 marks)
  - ii) Sibling (2 marks)
  - iii) Leaf node. (2 marks)
- d) Pointers are widely used in programming. Identify the benefits and drawbacks of using pointers. (8 marks)

**Total marks 20**

**Question 3**

- a) Explain the term "sorting" in relation to computer programming. (4 marks)
- b) With help of examples describe **four** types of sort algorithms.

**(16 marks)**

**Total marks 20**

**Question 4**

Discuss the differences and similarities between iteration and recursion.

**(20 marks)**

**Question 5**

In relation to programming languages that you know, discuss the following:-

- i) Constant and variable. (4 marks)
- ii) Data structure (4 marks)
- iii) Data type (4 marks)
- iv) Array (4 marks)

v) Compiler

(4 marks)

**Total marks 20****Question 6**

Discuss the development of computer language from the first to the fourth generation.

(20 marks)

**Question 7**

a) Define searching an item in an array.

(4 marks)

b) For the following array of strings

index	0	1	2	3	4	5	6	7	8	9	10
item	Dan	Mary	Ben	Ken	Silu	Phiri	Sam	Davy	Benj	Kai	Ndola

i) Design an algorithm to search an item **Kai** using binary search algorithm.

(5 marks)

ii) Design an algorithm to search an item **Kai** using linear search algorithm.

(5 marks)

iii) What is a search key and give an example.

(2 marks)

c) Write a program in c++/java to define an array of 25 data items of whole numbers.

(4 marks)

**Total marks 20**