nAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF INFORMATICS	
QUALIFICATION CODE: 07BCMS, 07BAIT	**LEVEL:** 5
COURSE: DATA STRUCTURES AND ALGORITHMS 1	**COURSE CODE**: DSA521S
DATE: JULY 2022	**PAPER:** THEORY
DURATION: 1 HOUR	**MARKS:** 50

SECOND OPPORTUNITY /SUPPLEMENTARY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
1. Answer ALL the questions.
2. Read all the questions carefully before answering.
3. Number the answers clearly

THIS QUESTION PAPER CONSISTS OF 5 PAGES
(Including this front page)

SECTION A: Multiple Choice Questions [15 Marks]

- Answer all the questions in the provided booklet.
- The section consists of 15 questions.

1. _____ Data structure does not require its size to be specified in advance

A. Linked list
B. Array
C. Both A & B
D. None of the above

2. ____is the term used to insert an element in the Queue?
A. Pop
B. Dequeue
C.Enqueue
D. Push

3. When trying to delete data from a stack, but the stack is empty; this situation is usually called...
A. Underflow
B. Overflow
C. Full Capacity
D. Error

4. A binary tree has n levels where level zero is the level of the root. And n denotes the last level. Given that the root has only one child, what is the minimum number of leaves of level n of the tree?
A. 4
B. 1
C. 8
D. -1

5. Given a list of elements; 3, 12, 6,16,9 inserted into a data structure in that order. An element is deleted using a basic data structure operation. If the deleted element is 9, the data structure cannot be a _____.?
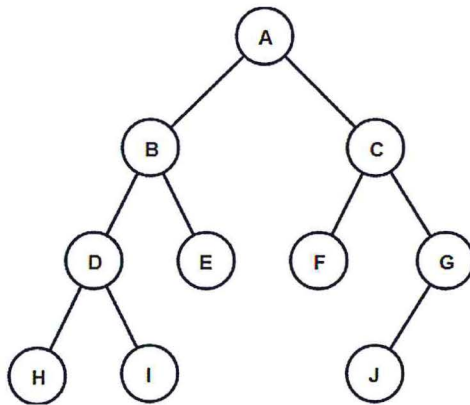A. Queue
B. Tree
C. Stack
D. Graph

6. In _____ search, start at the beginning of the list and check every element in the list.
A. Binary Search

B. Linear Search

C. Bubble Search

D. Jump Search

7.　A___is an ordered collection of items from which the items may be deleted from one end (front end) and items may be inserted at the other end (rear end).

A. Binary Search

B. Array

C. Stack

D. Queue

8. Given the following tree. Give the **Preorder** traversal.

A. ABDHIECGFS

B. HDIBEAFCJG

C. HIDEBFSFCA

D. ABDHIECFGS

9. What are the applications of Stack?

A. Queues in routers/switches

B. check parenthesis matching in an expression

C. Process scheduling

D. Shared resource

10. The time complexity of Binary Search Tree (BST) is

A. O(n)

B. O(log n)

C. O(h)

D. O(n log n)

11. Which of the following is/are the levels of implementation of data structures?

A. Abstract level

B. Application level

C. Implementation level

D. All the above

12. ___ is not a component of data structures and algorithms.
    A. Operations
    B. Storage Structures
    C. Algorithms
    D. None of the above

13. Two vertices in a graph are said to be adjacent vertices (or neighbours) if there is a path of length _____ connecting them.
    A. At least 1
    B. At least 2
    C. At least less than 2
    D. 1

14. If an array is sorted, it is recommended to use _____ search to search it.
    A. Sequential
    B. Binary
    C. Sentinel
    D. Probability

15. If the node to be deleted has _____, we delete the node and attach the left subtree to the deleted node's parent.
    A. Only a left subtree
    B. Only a right subtree
    C. No children
    D. Has no children

SECTION B: Structured Questions [35]
- Answer all the questions in the provided booklet.
- The section consists of 5 questions.

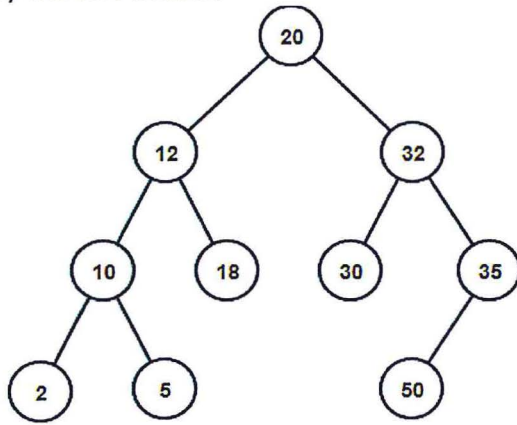2.1. Briefly discuss Give the difference between the following terms as used in Data Structures:
1. Queue and Array   [4]

2. Binary search and Linear search algorithms   [4]

2.2. Given the following array {20, 30, 60, 100, 90, 50, 130, 210, 160, 110}. Construct a Binary Search Tree (BST) . Using **PostOrder** traversal.   [10]
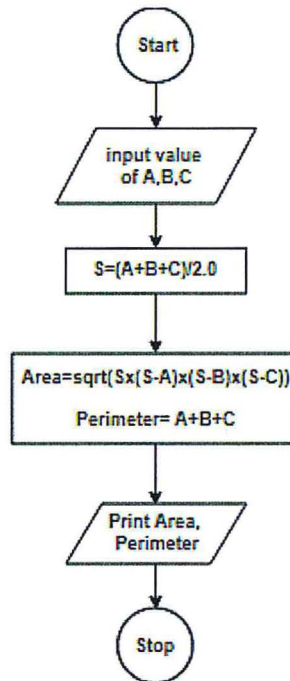
2.3. Study the BST below:

1. Delete the following nodes: 2, 5 and 50 and draw the new BST.   [4]

b. What is the maximum height/level of the BST after the operations in (a)?   [2]

2.4. Study the Flowchart below.

Write a pseudocode corresponding to the Flowchart program above.   [5]

2.5. Use the Insertion sort algorithm to sort the array below: **4,3,2,10,12,1,5,6**. Show content for each step.   [6]

*************************** End of the Paper *********************************