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: JUNE 2022	**PAPER:** THEORY
DURATION: 1 HOUR	**MARKS:** 50

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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MODERATOR:	**Mrs S. CHIVUNO-KURIA**

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 [10 Marks]

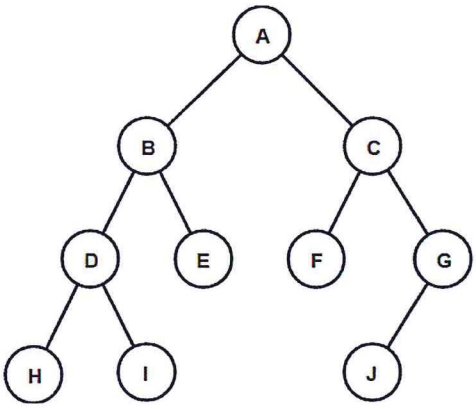
- Answer all the questions in the provided booklet.
- The section consists of 10 questions.

1. Which of the following operations can be performed on singly-linked list, doubly-linked list and circular linked list?
   A. Insertion - adding an element to the list.
   B. Deletion - removing an element from the list.
   C. Search - seek for an element in a given list.
   D. All of the above.

2. How many rows does twoDimenArray or matrix have if it is created as follows;
   int[][] twoDimenArray = { {14, 19, 9, 17}, {9, 21, 3, 20},{12,15,0,15},{22,1,0,18}};?
   A. 4
   B. 3
   C. 12
   D.0

3. Which of the following would you use to get the value in the second row and third column of a 2D array/matrix called twoDimenArray?
   A. twoDimenArray[2][3]
   B. twoDimenArray[0][2]
   C. twoDimenArray[1][2]
   D. twoDimenArray[3][2]

4. Given the following tree. Give its **Inorder traversal** algorithm output.



   A. ABDHIECGFS
   B. HDIBEAFCJG
   C. HIDEBFSFCA
   D. ABDHIECFGS

5. What are the applications of Stack?
   A. Queues in routers/switches
   B. check parenthesis matching in an expression
   C. Process scheduling
   D. Shared resource

6. 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

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

8. Two vertices in a graph are said to be adjacent vertices (or neighbors) 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

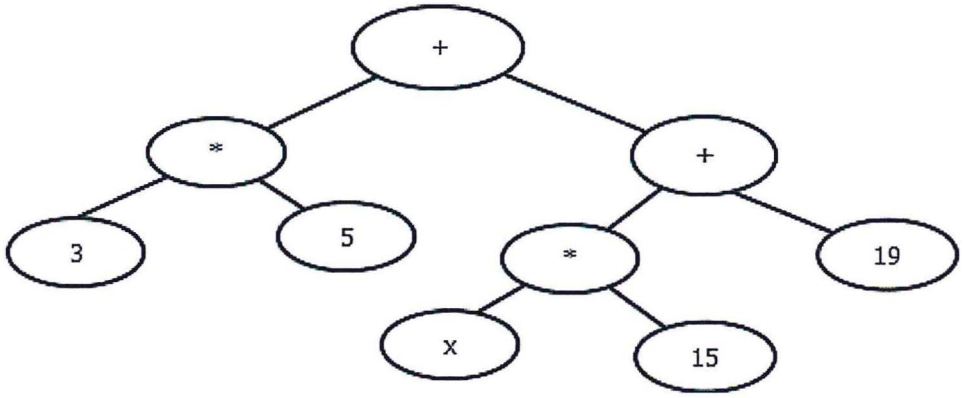
9. If the node to be deleted has _____, we delete the node and attach the left subtree to the deleted node's parent.
   A. Only a left subtree
   B. Only a right subtree
   C. No children
   D. Has no children

10. Which of the following is an approach to traversing a graph?
   A. Binary search.
   B. Sequential search.
   C. BothA and B are approaches to traversing a graph.
   D. None of A or B is an approach to traversing a graph.

SECTION B: Structured Questions [40 Marks]

- *Answer all the questions in the provided booklet.*
- *The section consists of 4 questions.*

2.1. An expression tree is a binary tree in which each internal node corresponds to an operator and each leaf node corresponds to an operand. Given the following expression tree, write down the outcome of in-order traversal of the tree in the provided text fields in correct order. **[18]**. **Note**: Please write in lowercase letters where necessary.



2.2. What is the height of the expression tree in 2.1 above? [2]

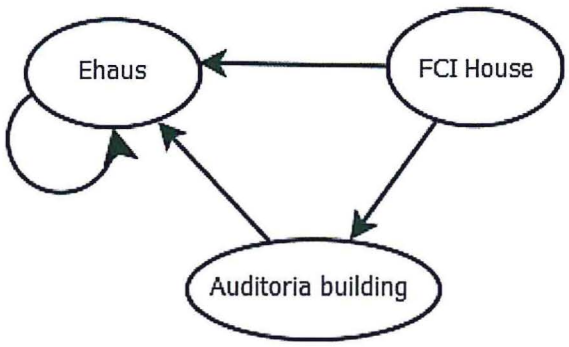
2.3. Given the pseudocode fragment below to find the largest number in a 2D matrix, rearrange the code fragment in correct order according to the numbering provided to successfully execute or to complete a correct algorithm. [10]

Please provide solution in the provided booklet.

		Solution
if(myValue> maxNumber) then	**1.**	
DO (row=0 **to** maxNumber.length-1)	**2**	
myValue=0	**3**	
Print maxNumber	**4**	
End	**5**	
ENDDO//end outer LOOP	**6**	
ENDDO//end inner LOOP	**7**	
DO (column=0 **to** maxNumber.length-1)	**8**	
maxNumber =myValue	**9**	

endif	**10**	
myValue= maxNumber[row][column]	**11**	
maxNumber=Matrix[0][0]	**12**	
Start	**13**	
ENDCASE		
maxNumber =55		
isFound=true		

2.4. Study the graph below and write an algorithm in pseudocode that implements this graph using an adjacency matrix. Your matrix should be named, **nustMap**. Your program/algorithm should print the resulting matrix. [10]



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