Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Science

End Sem (Even) Examination May-2022

CA3CO07 Data Structure

Programme: BCA, BCA+MCA (Integrated) Branch/Specialisation: Computer Application

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Which of the following is a non-linear data structure? **1**

(a) Stacks (b) List (c) Strings (d) Trees

ii. Those data types for which a language has built-in support are known as- **1**

(a) Built-in data types (b) Derived data types

(c) Both (a) and (b) (d) None of these

iii. A program P reads in 500 integers in the range [0,100] representing the scores of 500 students. It then prints the frequency of each score above 50. What would be the best way for P to store the frequencies? **1**

(a) An array of 50 numbers

(b) An array of 100 numbers

(c) An array of 500 numbers

(d) A dynamically allocated array of 550 numbers

iv. An n*n array V is defined as follows **1**

V[i,j]=i-j for all i,j, 1<=i<=n;1<=j<=n;

The sum of the elements of the array V is-

(a) 0 (b) n-1 (c) n^2-3n+2 (d) n^2(n+1)/2

v. Which one of the following is an application of Stack Data Structure? **1**

(a) Managing function calls

(b) The stock span problem

(c) Arithmetic expression evaluation

(d) All of these

P.T.O.

vi. Which one of the following is an application of Queue Data Structure? **1**
(a) When a resource is shared among multiple consumers.
(b) When data is transferred asynchronously (data not necessarily received at same rate as sent) between two processes
(c) Load Balancing
(d) All of these

vii. Which of the following information is stored in a doubly linked list's node? **1**
(a) Value of node (b) Address of next node
(c) Address of previous node (d) All of these

viii. The number of external nodes in a full binary tree with 'n' internal nodes is- **1**
(a) n (b) n+1 (c) 2n (d) 2n + 1

ix. What is the worst case complexity of bubble sort? **1**
(a) O(nlogn) (b) O(logn) (c) O(n) (d) $O(n^2)$

x. Which of the following is not an application of binary search? **1**
(a) To find the lower/upper bound in an ordered sequence
(b) Union of intervals
(c) Debugging
(d) To search in unordered list

Q.2 Attempt any two:
i. Explain the operations that can be performed on a data structure giving proper example **5**
ii. What do you mean by data and data type? Explain various data types in C in detail with example **5**
iii. What is data structure? Explain classification of data structure. **5**

Q.3 Attempt any two:
i. Define array. Write a program to pass an array to a function and find the largest element. **5**
ii. Explain how a string is stored in memory. Also write a program to compare two given strings. **5**
iii. Write a program to add two matrices. **5**

Q.4 Attempt any two:
i. Write program to perform insertion and deletion operation in Circular Queue. **5**
ii. Write an algorithm for PUSH and POP Operation in stack. **5**
iii. Convert the infix expression A + B * (C + D) / F + D * E into postfix. Demonstrate all steps properly. **5**

Q.5 Attempt any two:
i. Draw Tree step by step based on below traversal order **5**
Postorder G D B H I E F C O
Inorder D G B O H E I C F
ii. Write program to demonstrate concept of insertion at end in linked list. **5**
iii. Construct an AVL tree by inserting the following elements in the given order 63, 9, 19, 27, 18, 108, 99, 81. **5**

Q.6 Attempt any two:
i. Write program to demonstrate concept of binary search. **5**
ii. Sort the given array using Bubble sort. Demonstrate all passes. **5**
39, 9, 81, 45, 90, 27, 72, 18.
iii. What is graph? Discuss BFS traversal technique using an example. **5**

******

Marking Scheme CA3CO07 Data Structure

Q.1	i.	Which of the following is a non-linear data structure? (d) Trees		**1**
	ii.	Those data types for which a language has built-in support are known as- (a) Built-in data types		**1**
	iii.	A program P reads in 500 integers in the range [0,100] representing the scores of 500 students. It then prints the frequency of each score above 50. What would be the best way for P to store the frequencies? (a) An array of 50 numbers		**1**
	iv.	An n*n array V is defined as follows V[i,j]=i-j for all i,j, 1<=i<=n;1<=j<=n; The sum of the elements of the array V is- (a) 0		**1**
	v.	Which one of the following is an application of Stack Data Structure? (d) All of these		**1**
	vi.	Which one of the following is an application of Queue Data Structure? (d)All of these		**1**
	vii.	Which of the following information is stored in a doubly linked list's node? (d) All of these		**1**
	viii.	The number of external nodes in a full binary tree with 'n' internal nodes is- (b) n+1		**1**
	ix.	What is the worst case complexity of bubble sort? (d) $O(n^2)$		**1**
	x.	Which of the following is not an application of binary search? (d) To search in unordered list		**1**
Q.2		Attempt any two:		
	i.	Five operations- 1 Mark each	(1 Mark*5)	**5**
	ii.	Data and data type	2 Marks	**5**
		Data types in C in detail with example	3 Marks	
	iii.	Data structure	1 Mark	**5**
		Explain classification of data structure.	4 Marks	

Q.3		Attempt any two:		
	i.	Define array.	1 Mark	**5**
		Input	1 Mark	
		Output	1 Mark	
		Logic	2 Marks	
	ii.	Explain how a string is stored in memory.	2 Marks	**5**
		Input	1 Mark	
		Output	1 Mark	
		Logic	1 Mark	
	iii.	Input	1 Mark	**5**
		Output	1 Mark	
		Logic	3 Marks	
Q.4		Attempt any two:		
	i.	Insertion	3 Marks	**5**
		Deletion	2 Marks	
	ii.	PUSH	2.5 Marks	**5**
		POP	2.5 Marks	
	iii.	Stepwise marking (5 steps)	1 Mark each (1 Mark*5)	**5**
Q.5		Attempt any two:		
	i.	Stepwise marking (5 steps)	1 Mark each (1 Mark*5)	**5**
	ii.	Input	1 Mark	**5**
		Output	1 Mark	
		Logic	3 Marks	
	iii.	Stepwise marking	1 Mark each (1 Mark*5)	**5**
Q.6		Attempt any two:		
	i.	Input	1 Mark	**5**
		Output	1 Mark	
		Logic	3 Marks	
	ii.	Pass-wise marking	1 Mark each (1 Mark*5)	**5**
	iii.	What is graph	1 Mark	**5**
		BFS traversal technique	3 Marks	
		Example.	1 Mark	