

Enrollment No.....



Faculty of Science
End Sem (Odd) Examination Dec-2018
BC3CO09 Data Structure

Programme: B.Sc. (CS) Branch/Specialisation: Computer Science

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. Representation of data structure in memory is known as: **1**
 (a) Recursive (b) Abstract data type
 (c) Storage structure (d) File structure
- ii. A linear collection of data elements where the linear node is given by means of pointer is called **1**
 (a) Linked list (b) Node list (c) Primitive list (d) None of these
- iii. The extra key inserted at the end of the array is called a, **1**
 (a) End key (b) Stop key (c) Sentinel (d) Transposition
- iv. Each array declaration need not give, implicitly or explicitly, the information about **1**
 (a) The name of array
 (b) The data type of array
 (c) The first data from the set to be stored
 (d) The index set of the array
- v. The data structure required for Breadth First Traversal on a graph is **1**
 (a) Queue (b) Stack (c) Array (d) Tree
- vi. The data structure required to evaluate a postfix expression is **1**
 (a) Queue (b) Stack (c) Array (d) Linked list
- vii. What is true about linked list? **1**
 (a) A list is a dynamic data structure
 (b) A list is a static data structure having variable storage
 (c) A stack can't be implemented by a linear linked list
 (d) None of these
- viii. If a node in a BST has two children, then its Inorder predecessor has **1**
 (a) No left child (b) No right child
 (c) Two children (d) No child

- ix. What sorting algorithms have their best and worst case times equal **1**
 (a) Heap and selection sort (b) Insertion sort & quick sort
 (c) Quick sort and heap sort (d) None of these
- x. A graph with n vertices will definitely have a parallel edge or self-loop of the total number of edges are **1**
 (a) More than n (b) More than n+1
 (c) More than (n+1)/2 (d) More than n(n-1)/2
- Q.2 i. Define Data Structure with its types. **2**
 ii. Explain Space and Time Complexity with example. **3**
 iii. Explain asymptotic notation. **5**
- OR iv. Difference between recursion and iteration method. **5**
- Q.3 i. What is Array? Write down its advantage & disadvantage. **2**
 ii. Write a program to multiply two matrices. **8**
- OR iii. An array X [-15.....10, 15.....40] requires one byte of storage. **8**
 If beginning location is 1500 determine the location of X [15] [20] using row major and column major.
- Q.4 i. What is a stack? Write down the application of stack? **3**
 ii. Write down the algorithm of push and pop operation in stack. **7**
- OR iii. Write down the algorithm to implement queue. **7**
- Q.5 i. What is a linked list? Explain its types also. **4**
 ii. Write a short note on **6**
 (a) Extended Binary tree (b) Complete Binary tree
- OR iii. Insert 14, 17, 11, 7, 53, 4 into an empty AVL tree. **6**
- Q.6 Attempt any two: **5**
 i. Prove that the time complexity of quick sort in average case is $O(n \log n)$. **5**
 ii. Explain the working of Insertion sort algorithm with the help of an example. **5**
 iii. Write the difference between DFS and BFS graph traversing. **5**

P.T.O.

Marking Scheme
BC3CO09 Data Structure

Q.1	i.	Representation of data structure in memory is known as: (b) Abstract data type	1	
	ii.	A linear collection of data elements where the linear node is given by means of pointer is called (a) Linked list	1	
	iii.	The extra key inserted at the end of the array is called a, (c) Sentinel	1	
	iv.	Each array declaration need not give, implicitly or explicitly, the information about (c) The first data from the set to be stored	1	
	v.	The data structure required for Breadth First Traversal on a graph is (a) Queue	1	
	vi.	The data structure required to evaluate a postfix expression is (b) Stack	1	
	vii.	What is true about linked list? (a) A list is a dynamic data structure	1	
	viii.	If a node in a BST has two children, then its Inorder predecessor has (b) No right child	1	
	ix.	What sorting algorithms have their best and worst case times equal (d) None of these	1	
	x.	A graph with n vertices will definitely have a parallel edge or self-loop of the total number of edges are (d) More than $n(n-1)/2$	1	
Q.2	i.	Definition of data structure	1 mark	2
		Data structure types	1 mark	
	ii.	Space complexity	1.5 marks	3
		Time complexity	1.5 marks	
	iii.	Asymptotic notation definition	2 marks	5
		3 types of asymptotic notation		
		1 mark for each (1 mark * 3)	3 marks	
OR	iv.	Difference between recursion and iteration method		5
		Any 5 points 1 mark for each point (1 mark * 5)	5 marks	

Q.3	i.	Array definition	1 mark	2
		One advantage	0.5 mark	
		One disadvantage	0.5 mark	
	ii.	Matrix A declaration and input from user	2 marks	8
		Matrix B declaration and input from user	2 marks	
		Matrix c declaration and matrix multiplication logic	2 marks	
		Result display in matrix form	2 marks	
OR	iii.	2D Array row major and column major address calculation		8
		Row major address calculation	4 marks	
		Column major address calculation	4 marks	
Q.4	i.	Stack definition	1 mark	3
		Any 2 applications of stack each 1 marks	2 marks	
	ii.	Push algorithm of stack	3.5 marks	7
		Pop algorithm of stack	3.5 marks	
OR	iii.	Insertion algorithm of queue	3.5 marks	7
		Deletion algorithm of queue	3.5 marks	
Q.5	i.	Linked list definition	2 marks	4
		4 types of linked list 0.5 mark for each type (0.5 mark * 4)	2 marks	
	ii.	Write a short note on		6
		(a) Extended Binary tree	3 marks	
		(b) Complete Binary tree	3 marks	
OR	iii.	Each element insertion in AVL tree 1 mark	(1 mark * 6)	6
Q.6		Attempt any two:		
	i.	Time complexity of quick sort in average case is $O(n \log n)$.		5
	ii.	Insertion sort algorithm	2.5 marks	5
		Example of insertion sort	2.5 marks	
	iii.	Difference between DFS and BFS graph traversing		5
		Any five points – 1 mark each	(1 mark * 5)	
