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

Enrollment No.....

Faculty of Science

End Sem (Odd) Examination Dec-2019

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. Which of the following abstract data types can be used to represent a many to many relations? **1**

(a) Tree only (b) Stack only

(c) Graph only (d) Both (b) and (c)

ii. Running out of memory may occur due to **1**

(a) No-recursive function call

(b) Recursive function call

(c) Use of more global variable

(d) None of these

iii. Sparse matrices have **1**

(a) Many zero entries (b) Many non zero entries

(c) Higher dimension (d) None of these

iv. The smallest element of an array's index is called **1**

(a) Lower bound (b) Upper bound

(c) Range (d) Extraction

v. What is the postfix form of the following prefix *+AB-CD? **1**

(a) AB+CD-* (b) ABC+*-

(c) AB+*CD- (d) AB+C*D-

vi. What can be said about the array representation of a circular queue when it contains only one element? **1**

(a) Front=Rear=Null (b) Front=Rear+1

(c) Front=Rear-1 (d) Front=Rear

P.T.O.

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) Both (a) and (b)

viii. The maximum number of nodes on level i of a binary tree is **1**
(a) 2^{i-1} (b) 3^{i-1} (c) i+1 (d) 2^{i+2}

ix. Binary search can work only if **1**
(a) List contain odd number of elements
(b) List contain even number of elements
(c) List should be sorted
(d) No matter what type of list is.

x. The average search time of hashing, with linear probing will be less if the load factor **1**
(a) Is far less than one (b) Equals one
(c) Is far greater than one (d) None of these

Q.2 Attempt any two:

i. What are the various operations that can be performed on different data structures? **5**

ii. Define asymptotic notation. Explain various asymptotic notations used to calculate time complexities of an algorithm. **5**

iii. List out the classification of data structure and explain them briefly. **5**

Q.3 Attempt any two:

i. Write a program to reverse a given string without using standard function. **5**

ii. Write an algorithm to find maximum and minimum element in one-dimension array. **5**

iii. A two-dimension array in C, defined as a[4….7] [-1….3] requires 2 bytes of storage space for each element. If array is stored in row major form, then calculate the address of element at location a[6,2] where base address is 100. **5**

Q.4 i. What is circular queue? How do you represent it? **3**

ii. Write a program to insert a node in a queue and to delete a node from a queue. **7**

OR iii. Convert expression A+(B*C-(D/E-F)*G)*H into postfix form showing stack status after every step in tabular form. **7**

Q.5 i. Define the following: **3**
(a) Extended binary tree (b) Strictly binary tree

ii. The following sequence gives the pre-order and in-order of the binary tree T: **7**
Pre-order: A B D G C E H I F
In-order: D G B A H E I C F
Draw the diagram of the tree.

OR iii. Write an algorithm to delete an item from specified position in the linked list. **7**

Q.6 i. What is hashing? What is the use of hashing? **3**

ii. Write a program to sort the elements of an array using bubble sort technique? **7**

OR iii. What are the different types of searching techniques? Explain one which is more efficient among them. **7**

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Marking Scheme
BC3CO09 Data Structure

Q.1	i.	Which of the following abstract data types can be used to represent a many to many relations? (c) Graph only	**1**
	ii.	Running out of memory may occur due to (b) Recursive function call	**1**
	iii.	Sparse matrices have (a) Many zero entries	**1**
	iv.	The smallest element of an array's index is called (a) Lower bound	**1**
	v.	What is the postfix form of the following prefix *+AB-CD? (a) AB+CD-*	**1**
	vi.	What can be said about the array representation of a circular queue when it contains only one element? (d) Front=Rear	**1**
	vii.	What is true about linked list? (d) Both (a) and (b)	**1**
	viii.	The maximum number of nodes on level i of a binary tree is (a) 2^{i-1}	**1**
	ix.	Binary search can work only if (c) List should be sorted	**1**
	x.	The average search time of hashing, with linear probing will be less if the load factor (a) Is far less than one	**1**
Q.2		Attempt any two:	
	i.	Operations that can be performed on different data structures 1 mark for each operation (1 mark * 5)	**5**
	ii.	Definition of asymptotic notation 2 marks Describing notations 3 marks	**5**
	iii.	Classification of data structure Diagram 2 marks Description 3 marks	**5**
Q.3		Attempt any two:	
	i.	Program to reverse a given string without using standard function Stepwise marking on the basis of logic	**5**
	ii.	Algorithm to find maximum and minimum element Stepwise marking	**5**
	iii.	Calculate the address of element at location a[6,2] Writing formula 1 mark Solution 4 marks	**5**
Q.4	i.	Defining circular queue 1 mark Representation 2 marks	**3**
	ii.	Program to insert a node in a queue and to delete a node from a queue. Stepwise marking on the basis of logic	**7**
OR	iii.	Convert expression A+(B*C-(D/E-F)*G)*H into postfix form showing stack status after every step in tabular form. Complete solution Stepwise marking	**7**
Q.5	i.	Define the following: (a) Extended binary tree 1.5 marks (b) Strictly binary tree 1.5 marks	**3**
	ii.	Draw the diagram of the tree. Complete solution Stepwise marking	**7**
OR	iii.	Algorithm to delete an item from specified position Stepwise marking	**7**
Q.6	i.	Definition of hashing 1.5 marks Use of hashing 1.5 marks	**3**
	ii.	Program to sort the elements of an array using bubble sort technique Stepwise marking	**7**
OR	iii.	Types of searching techniques 5 marks Efficient techniques 2 marks	**7**

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