Enrollment No.....................................

Faculty of Science / Engineering
End Sem Examination May-2024
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. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i.   Which of the following is a non-linear data structure?   1
           (a) Stack   (b) List   (c) Queue   (d) Tree

     ii.   Which of the following case does not exist in complexity theory?   1
           (a) Best case   (b) Upper case
           (c) Average case   (d) Worst case

     iii. What are the disadvantages of arrays?   1
           (a) Data structure like queue or stack cannot be implemented
           (b) There are chances of wastage of memory space if elements inserted in an array are lesser than the allocated size
           (c) Index value of an array can be negative
           (d) Elements are sequentially accessed

     iv.   What is the output of C Program with Strings?   1
           int main()
           {
              char str[]={'g','l','o','b','e'};
              printf("%s",str);
              return 0;
           }
           (a) g   (b) globe   (c) globe\0   (d) None of these

     v.   The postfix form of A*B+C/D is-   1
           (a) *AB/CD+ (b) AB*CD/+ (c) A*BC+/D (d) ABCD+/*

     vi.   In a circular queue, how do you increment the rear end of the queue?   1
           (a) rear++   (b) (rear+1)%CAPACITY
           (c) (rear%CAPACITY)+1   (d) rear --

vii. Consider the following definition in C programming language- **1**
struct node:
{
int data;
struct node * next;
}
typedef struct node NODE;
NODE *ptr;
Which of the following C code is used to create new node?
(a) ptr = (NODE*)malloc(sizeof(NODE));
(b) ptr = (NODE*)malloc(NODE);
(c) ptr = (NODE*)malloc(sizeof(NODE*));
(d) ptr = (NODE)malloc(sizeof(NODE));

viii. A binary tree where every node has either 0 or 2 children is called: **1**
(a) Full binary tree
(b) Perfect binary tree
(c) Complete binary tree
(d) Degenerate tree

ix. What is the best case time complexity for linear search? **1**
(a) O(nlogn)   (b) O(logn)   (c) O(n)   (d) O(1)

x. What is a hash table? **1**
(a) A structure that maps values to keys
(b) A structure that maps keys to values
(c) A structure used for storage
(d) A structure used to implement stack and queue

Q.2 i. Explain the term data and data type. **2**

ii. What do you mean by algorithm complexity? Define space and time **3**
complexity with an example.

iii. What is data structure'? Explain classification of data structure. **5**

OR iv. Describe different asymptotic notations. **5**

Q.3 i. Describe multidimensional array with syntax and example. **4**

ii. Explain how a string is stored in memory and write a program to find **6**
the frequency of a character in a string.

OR iii. Describe the storage structure of 2D Array and write a program to **6**
pass an array to a function and find the largest element.

Q.4 i. Convert the infix expression A + B * C / D – F + A ^ E into postfix. **3**
Demonstrate all steps properly.

ii. Write a program for the implementation of push, pop and display **7**
operations on stack by using an array.

OR iii. Write program to perform insertion, deletion and traversal operation **7**
in Circular Queue.

Q.5 i. Write program to demonstrate concept of insertion at end in linked **4**
binary list.

ii. Draw tree step by step based on below traversal order- **6**
(a) Preorder: A,B,D,E,F,C,G,H,J,L,K
    Inorder : D,B,F,E,A,G,C,L,J,H,K

(b) Postorder: D,F,E,B,G,L,J,K,H,C,A
    Inorder: D,B,F,E,A,G,C,L,J,H,K

OR iii. What is AVL tree? Explain right (RR) and left rotations (LL) with **6**
the help of an example.

Q.6 Attempt any two:
i. Write program to demonstrate concept of binary search. **5**

ii. Write the steps to sort following list 10, 9, 11, 6, 15, 2 in ascending **5**
order, using bubble sort.

iii. Explain DFS and BFS graph traversal techniques with an example. **5**

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Marking Scheme
Data Structure (T) CA3CO07 (T)

Q.1 i)   d) Tree   **1**

ii)   b) Upper case   **1**

iii) b) There are chances of wastage of memory space if elements   **1**
      inserted in an array are lesser than the allocated size

iv)   int main()   **1**
      {
        char str[]={'g','l','o','b','e'};
        printf("%s",str);
        return 0;
      }
      d) None of the above

v)   b)AB*CD/+   **1**

vi)   b)(rear+1)%CAPACITY   **1**

vii) struct node   **1**
      {
      int data;
      struct node * next;
      }
      typedef struct node NODE;
      NODE *ptr;

      Which of the following c code is used to create new node?
      (a) ptr = (NODE*)malloc(sizeof(NODE));

viii) a) Full Binary Tree   **1**

ix)   What is the best case for linear search?   **1**
      d) O(1)

x)   What is a hash table?   **1**
      b) A structure that maps keys to values

Q.2	i.	Data definition	1 Mark	**2**
		Data type.	1 Mark	
	ii.	Algo	1 Mark	**3**
		Time Complexity	1 Mark	
		Space	1 Mark	
	iii.	Data structure definition	2 Marks	**5**
		classification of data structure	3 Marks	
OR	iv.	Define Agymptotic Notation	2 Marks	**5**
		Bio…	1 Mark	

		Theta	1 Mark	
		O Megha	1 Mark	
Q.3	i.	Description of Multidimensional Array	2 Marks	**4**
		Syntax	1 Mark	
		Example	1 Mark	
	ii.	how a string is stored in memory	3 Marks	**6**
		program to find the frequency of a character	3 Marks	
OR	iii.	The storage structure of 2D Array	2 Marks	**6**
		Program to pass an array ………… element.	4 Marks	
Q.4	i.	Convert the infix …… properly	3 Marks	**3**
	ii.	Declaration	1 Mark	**7**
		Push	2 Marks	
		Pop	2 Marks	
		Display	2 Marks	
OR	iii.	Declaration	1 Mark	**7**
		Insertion	2 Marks	
		Deletion	2 Marks	
		Traversing	2 Marks	
Q.5	i.	Program to …….. linked list.	4 Marks	**4**
	ii.	(a) Preorder: A,B,D,E,F,C,G,H,J,L,K	3 Marks	**6**
		Inorder : D,B,F,E,A,G,C,L,J,H,K		
		(b) Postorder: D,F,E,B,G,L,J,K,H,C,A	3 Marks	
		Inorder: D,B,F,E,A,G,C,L,J,H,K		
OR	iii.	AVL Tree	2 Marks	**6**
		Right and left rotations with example.	4 Marks	
Q.6		Attempt any two:		
	i.	Initialization	1.5 Marks	**5**
		Logic	3 Marks	
		Output	0.5 Marks	
	ii.	Step by step solution	5 Marks	**5**
	iii.	Description DFS	2 marks	**5**
		Example	0.5 mark	
		Description BFS	2 marks	
		Example	0.5 marks	

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[2]

[3]