

BCA/3/CC/14

Student's Copy

Professional Course (Odd) Examination, 2022

( 3rd Semester )

**BACHELOR OF COMPUTER APPLICATIONS**

Course No. : BCA/3/CC/14

**( Data Structure using C )**

( Revised )

Full Marks : 75

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

**( PART : A—OBJECTIVE )**

( Marks : 25 )

SECTION—I

( Marks : 15 )

A. Choose and write the correct answer :

1×10=10

1. How is an array initialized in C language?

(a) `int arr[ ] = {1, 2, 3}`

(b) `int arr = {1, 2, 3}`

(c) `int arr[3] = {1, 2, 3}`

(d) `arrays(3) = {1, 2, 3}`

2. Which of the following is non-linear data structure?

(a) Stack

(b) List

(c) Queue

(d) Trees

3. Which of the following data structures finds its use in recursion?

(a) Arrays

(b) Stack

(c) Linked list

(d) Queue

4. The prefix equivalent of the infix expression  $A * (B + C) / D$  is

(a)  $* + A / BCD$

(b)  $/* A + BCD$

(c)  $* / AB + CD$

(d)  $/* ABC + D$

5. Which of the following sorting algorithms is the fastest?

(a) Merge sort

(b) Insertion sort

(c) Quicksort

(d) Bubble sort



6. Identify the data structure which allows deletions at both ends of the list but insertion at only one end.

- (a) Input restricted dequeue
- (b) Output restricted dequeue
- (c) Circular queue
- (d) Ordinary queue

7. Which of the following statements is not true about linked lists?

- (a) Element in a linked list, if it is sorted, can be quickly searched by applying binary search technique.
- (b) Elements are not necessarily stored in contiguous locations.
- (c) Insertions and deletions can be performed efficiently as compared to arrays.
- (d) Linked list is a dynamic structure.

8. In circular linked list, insertion of node requires modification of

- (a) one-pointer
- (b) two-pointer
- (c) three-pointer
- (d) None of the above

9. Which of the following represents the post-order traversal of a binary tree?

- (a) Root  $\rightarrow$  Left  $\rightarrow$  Right
- (b) Right  $\rightarrow$  Left  $\rightarrow$  Root
- (c) Left  $\rightarrow$  Right  $\rightarrow$  Root
- (d) Left  $\rightarrow$  Root  $\rightarrow$  Right

10. What is the number of edges present in a complete graph having  $n$  vertices?

(a)  $(n * (n + 1)) / 2$

(b)  $(n * (n - 1)) / 2$

(c)  $n$

(d)  $n / 2$

B. State whether the following statements are True or False :

1×5=5

1. A pointer stores the next data element of a list.
2. An array circular queue  $(n - 1)$  elements and  $n$  elements with  $REAR = FRONT = 0$ . To detect queue full and queue empty are Full :  $(REAR + 1) \bmod n == FRONT$ , Empty :  $REAR == FRONT$ .
3. Linear search requires that the list of elements must be in sorted order.
4. In a linked list, there are no NULL links in empty linked list.
5. Depth-first search is equivalent to the pre-order traversal of a binary tree.

## SECTION—II

(Marks : 10)

C. Answer the following questions :

2×5=10

1. (a) What is non-linear data structure? Give examples.

OR

- (b) Define an array. How is it represented in memory?



2. (a) Distinguish between Stack and Queue.

OR

(b) How does a recursive differ from iteration?

3. (a) Sort the following using insertion sort :

8      4      2      0

OR

(b) What are sorting and searching?

4. (a) State the difference between Array and Linked list.

OR

(b) What is need of doubly linked list?

5. (a) What is a complete binary tree?

OR

(b) Differentiate between DFS and BFS.

### ( PART : B—DESCRIPTIVE )

( Marks : 50 )

D. Answer the following questions :

10×5=50

1. (a) Differentiate between Static and Dynamic memory allocations. Write the syntax and explain the different four functions used in dynamic memory allocation.

10

OR

(b) What is data structure? What are the different operations on data structure?

7

(c) How does structure differ from union?

3

2. (a) What is stack? Write an algorithm how the elements will be push and pop in a stack. What are the applications of stack? 10

OR

- (b) Convert the following infix expression to postfix using stack : 5

$$(A + B * C) / (D - E) + F$$

- (c) Explain the working of circular queue. 5

3. (a) Write a C program to sort  $n$  elements in an array using bubble sort. 5

- (b) Write a C program to sort  $n$  elements in an array using selection sort. 5

OR

- (c) Write a C program to implement binary search using array. Explain the working of binary search with the following given numbers : 10

11, 17, 25, 43, 50, 72, 98

4. (a) What are the types of linked list? Write the advantages and disadvantages of different types of linked list. Mention the applications of linked list. 10

OR

- (b) Consider a singly linked list with five items. Write the steps for inserting an item at given position. 5

- (c) Write a C function to delete the last node in a doubly linked list. 5

5. (a) Construct a binary search tree (BST) for the sequence of numbers

51, 76, 62, 24, 99, 8, 44, 103

Perform the following :

(i) Insert 15

(ii) Delete 99

(iii) Insert 87

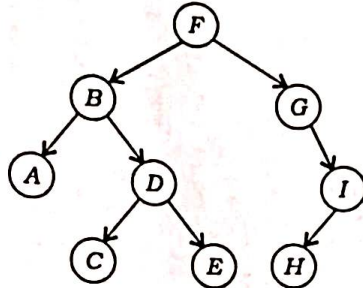
(iv) Delete 51



OR

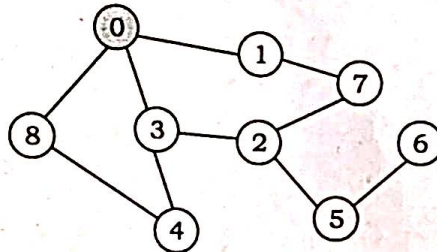
- (b) Write the pre-order and post-order traversals from the following tree :

5



- (c) Traverse the following graph by breadth-first search (BFS) and print all the vertices reachable from start vertex 0 :

5



\*\*\*