

Professional Course Examination (Odd), 2023
(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Course No. : BCA/3/CC/14

(Data Structure using C)

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)

I. Tick (✓) the correct answer in the brackets provided : 1×10=10

1. The arrangement of memory space according to the size of information for maximum utility of the memory space is called
 - (a) binary structure ()
 - (b) primary data types ()
 - (c) data structure ()
 - (d) memory space ()

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2. In dynamic memory allocation, the function returns the
- (a) address of the first byte of the allocated space ()
 - (b) value of the space ()
 - (c) address of the last cell ()
 - (d) value of the last element ()
3. In circular queue, addition of the front element gives birth to which of the following changes?
- (a) $f=(f+1)\%Q_Size$ ()
 - (b) $r=r+1$ ()
 - (c) $f=r=0$ ()
 - (d) $f=f+1, r=r+1$ ()
4. A function that calls itself is called
- (a) user-defined function ()
 - (b) pre-defined function ()
 - (c) main function ()
 - (d) recursive function ()
5. Searching all the elements of the array from the first one is called
- (a) binary search ()
 - (b) whole search ()
 - (c) merge search ()
 - (d) sequential search ()
6. Bubble sort is also known as
- (a) insertion sort ()
 - (b) selection sort ()
 - (c) sinking sort ()
 - (d) merge sort ()

7. A doubly linked list has
- (a) 2 fields ()
 - (b) 3 fields ()
 - (c) 4 fields ()
 - (d) 5 fields ()
8. In a circular linked list, the link field of the last node contains
- (a) null ()
 - (b) 0 ()
 - (c) address of the second last node ()
 - (d) address of the first node ()
9. The inorder traversal has a sequence
- (a) left-right-root ()
 - (b) left-right-left ()
 - (c) left-root-right ()
 - (d) right-root-left ()
10. A complete binary tree will have
- (a) 3^i number of nodes in the i th level ()
 - (b) 2^i number of nodes in the i th level ()
 - (c) $(i+1)$ th nodes ()
 - (d) $(i+j)$ th nodes ()

II. State whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark in the brackets provided : 1×5=5

1. Graph is a linear data structure.

(T / F)

2. The prefix expression of $(a + b) / c$ is $ab + c /$.

(T / F)

3. In selection sort, we select the smallest one and exchange it with the first element.

(T / F)

4. In a doubly linked list, the last node contains the item only.

(T / F)

5. All trees are graphs while all graphs are not trees.

(T / F)

SECTION—II

(Marks : 10)

2×5=10

III. Answer the following questions :

1. (a) What are linear data structures? Give examples.

OR

(b) Mention the differences between structure and union.

2. (a) What is the prefix version of $((a + (b - c)^* d) \wedge e + f)$?

OR

(b) What is the postfix version of $((a + (b - c)^* d) \wedge e + f)$?

3. (a) Briefly explain a merge sort.

OR

(b) How does a binary search work?

4. (a) What are the drawbacks of a simple linked list?

OR

(b) Explain the node structure/composition of a doubly circular linked list.

5. (a) Briefly define a binary tree with an example.

OR

(b) Explain in brief the binary search tree.

(PART : B—DESCRIPTIVE)

(Marks : 50)

IV. Answer the following questions :

10×5=50

1. (a) What is the difference between static and dynamic memory allocations? Explain the four dynamic memory allocation functions with their syntax.

6+4=10

OR

(b) (i) Explain different types of linear data structure.

7

(ii) What are the advantages and disadvantages of using pointer?

3

2. (a) Explain the concept of recursive function by taking a Fibonacci sequence as example.

5

(b) By mentioning every step, what will be the value of a postfix expression $8\ 2/3*3\ 1+-?$

5

OR

(c) With a C program example, explain the operations of a linear queue.

8

(d) What are the applications of queues?

2

3. (a) Write a C program to implement a sequential search.

4

(b) Write a C program to sort n elements using insertion sort.

6

OR

(c) Explain in detail how a quick sort works for the following data : 10

36, 37, 11, 10, 42, 72, 65, 98, 8, 78

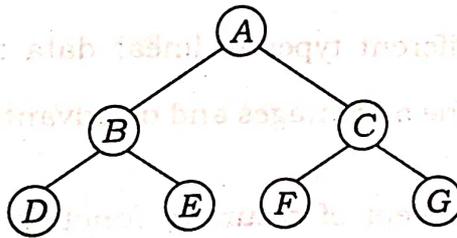
4. (a) Define a linked list. What are the advantages of a linked list? Write relevant C program of singly linked list to insert new node on any given position, to delete the last node and to display contents of the list. 2+4+4=10

OR

(b) Write a C program to implement a doubly linked list that insert at any given position, delete and display items. 10

5. (a) What are the different types of binary tree? Explain a complete binary and almost complete binary tree in detail. 1+2+2=5

(b) From the following binary tree, write down the inorder, preorder and the postorder traversals : 5



OR

(c) What are the DFS and BFS of the following graph, starting from the node A? 5+5=10

