## BCA/3/CC/14

# **Student's Copy**

## **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 ( $\checkmark$ ) the correct answer in the brackets provided :  $1 \times 10=10$ 

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
(e) binary space
(f) binary structure
(f) b

- 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
  - ( *(b)* 0 ) (

(a) null

- (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  $1 \times 5 = 5$ a Tick ( $\checkmark$ ) mark in the brackets provided :
  - 1. Graph is a linear data structure.

(T / F)

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

(T / F)

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- 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)

2×5=10

#### SECTION-II

#### (Marks: 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) e f)?

### OR

- (b) What is the postfix version of ((a (b c) d) 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.

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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 :

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

#### 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

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[ Contd.

10×5=50

### 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
- (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.

#### 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 :



OR

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



\* \* \*

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