Professional Course Examination, Odd, 2021
(3rd Semester)
BACHELOR OF COMPUTER APPLICATION
Paper No. : BCA/3/CC/14
Subject :(Data Structure Using C) (Revised)
Full Mark : 75
Time : 3 hours

(PART : A – OBJECTIVE)
(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION – I
(Marks : 15)

I. Choose the correct answer. **(10x1=10)**

1. Which of the following is not an abstract data type?
   a) array
   b) stack
   c) queue
   d) pointer

2. With every use of a memory allocation function, which function should be used to deallocate the memory which is no longer needed?
   a) release
   b) free
   c) malloc
   d) calloc

3. A linear list in which elements can be added or removed at either end but not in the middle is known as
   a) dequeue
   b) queue
   c) stack
   d) graph

4. Consider the following operation performed on a stack of size 5.
   Push(1);Pop();Push(2);Push(3);Pop();Push(4);Pop();Pop();Push(5);After the completion of all operation, the number of elements present in stack is
   a) 1
   b) 2
   c) 3
   d) 4

5. Which of these is not an application of a linked list?
   a) To implement file systems

b) For separate chaining in hash-tables
c) To implement non-binary trees
d) Random Access of elements

6. A desirable choice for the partitioning element in quick sort is
   a) First element
   b) middle element
   c) Last element
   d) random

7. Simplest sorting technique is
   a) Insertion sort
   b) Selection sort
   c) Bubble Sort
   d) Merge sort

8. Which of the following is false about a doubly linked list?
   a) We can navigate in both the directions
   b) It requires more space than a singly linked list
   c) The insertion and deletion of a node take a bit longer
   d) Implementing a doubly linked list is easier than singly linked list

9. The tree traversal technique in which the root is traversed before its children is known as
   a) post-order
   b) pre-order
   c) in-order
   d) last-order

10. Which data structure is used for BFS of graph?
    a) Stack
    b) Queue
    c) Linked list
    d) Both (a) & (b)

II. State whether the statements are True or False. **(5x1=5)**

1. Structure is a user defined data type. (T / F)
2. Stack is FILO. (T / F)
3. An Insertion sort, which iteratively passes through a list to exchange the first element with any element less than it and then repeats with a new first element. (T / F)
4. The singly linked list needs more memory than doubly linked list (T / F)
5. The in-order traversal of a Binary search tree produces the numbers in ascending order. (T / F)

SECTION – II
(Marks : 10)

III. Answer the following questions. **(5x2=10)**

a) What is Linear Data Structure? Give examples.

OR

What are the operations of Data Structure?

b) What are the applications of stack?

OR

Write the applications of Queue.

c) Distinguish between linear search and binary search.

OR

Mention two advantages and disadvantages of Selection sort.

d) List the advantages of circular linked list over single linked list.

OR

List two benefits of linked list over an array

e) Define Binary tree by giving an example.

OR

List any two differences between graphs and trees.

(PART : B – DESCRIPTIVE)
(Marks : 50)

Answer any **five** questions

1. (a) Explain structure and union with suitable example. **(6)**
(b) Write notes on time and space complexity. **(4)**

OR

(b) What is Dynamic Memory allocation? What are the different functions are there for dynamic memory allocation? Explain with its syntax. **(10)**

2. (a) Explain the concept of recursive function by taking tower of Hanoi as an example. **(5)**
(b) Convert the following infix expression to postfix expression by showing the operator stack and output string after reading each input token:
A * B + C * (D – E) - F * G **(5)**

OR

(c) Explain the working of queue. **(4)**
(d) Explain the procedure to evaluate postfix expression 6 2 3 + - 3 8 2 / + * 2 4 3 + **(6)**

3. (a) What is searching? Explain binary search with appropriate example. Write two points of its relative advantages and disadvantages? **(10)**

OR

(b) Trace the insertion sort algorithm for the following elements: 12, 25, 5, 9, 1, 84, 63, 7, 15, 4, 3. **(5)**

(c) Trace the quick sort algorithm for the following data: 65 70 75 80 85 60 55 50 45 **(5)**

4. (a) What is link list? Explain different types of linked list with appropriate diagram. Mention its relative's merits and demerits? **(10)**

OR

(c) Write an algorithm for insertion at the end of the circular linked list. **(5)**

(d) Write an algorithm for deletion of a node at any given position from a doubly linked list. **(5)**

5. (a) Create binary search tree for the following elements : 23, 12, 45, 36, 5, 15, 39, 2, 19.Write the pre-order and post-order of the tree. **(10)**

OR

(b) Explain Depth First Search with of the following graph and write any two applications of DFS. **(5)**

(c) Explain Breath First Search with the following graph and mention two applications of BSF. **(5)**