

Professional Course Examination, 2020

(2nd Semester)

BACHELOR OF COMPUTER APPLICATIONS

(Data Structure Using C)

Full Marks : 75

Time : 3 hours

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 15)

Tick (✓) the correct answer in the brackets provided :

1×10=10

1. Which linear structure has a provision of Last-In-First-Out (LIFO) mechanism for its elements?

(a) Queue ()

(b) Stack ()

(c) Both (a) and (b) ()

(d) Linked list ()

2. The complexity of linear search algorithm is

(a) $O(n)$ ()(b) $O(\log n)$ ()(c) $O(n^2)$ ()(d) $O(n \log n)$ ()

3. In linked list, there are no NULL links in

(a) singly linked list ()

(b) doubly linked list ()

(c) circular linked list ()

(d) Both (a) and (b) ()

4. Which of the following points is/are true about linked list data structure when it is compared with array?
- (a) Arrays have better cache locality that can make them better in terms of performance ()
 - (b) It is easy to insert and delete elements in linked list ()
 - (c) Random access is not allowed in a typical implementation of linked lists ()
 - (d) All of the above ()
5. Which algorithm specifies the addition of edges to the Spanning Tree in an increasing order of cost?
- (a) Prim's algorithm ()
 - (b) Kruskal's algorithm ()
 - (c) Dijkstra's algorithm ()
 - (d) Both (a) and (b) ()
6. The value of REAR is increased by 1 when
- (a) an element is deleted in a queue ()
 - (b) an element is traversed in a queue ()
 - (c) an element is added in a queue ()
 - (d) an element is merged in a queue ()
7. Which of the following statements is/are true for binary search trees?
- (a) The left subtree of a node contains only nodes with keys less than the node's key ()
 - (b) The right subtree of a node contains only nodes with keys greater than the node's key ()
 - (c) Both (a) and (b) ()
 - (d) Both left and right subtree nodes contains only nodes with keys less than the node's key ()
8. Leaves of which of the following trees are at the same level?
- (a) Binary tree ()
 - (b) B-tree ()
 - (c) AVL tree ()
 - (d) Normal tree ()
9. Which direction of scanning is suitable for the evaluation of a prefix expression?
- (a) Left to left ()
 - (b) Right to right ()
 - (c) Left to right ()
 - (d) Right to left ()

10. Where can we use Breadth First Search (BFS)?

- (a) Binary trees () (b) Stacks ()
(c) Graphs () (d) Queue ()

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

1. Space complexity refers to the amount of storage the algorithm consumes. (T / F)
2. In a pre-order traversal, the root node is visited first. (T / F)
3. A linear list in which each node has pointers to point to the predecessor and successor node is called singly circular linked list. (T / F)
4. A stack is a data structure in which insertions and deletions are restricted to one end. (T / F)
5. Each node in a linked list has two pairs of link field and information field. (T / F)

SECTION—B

(Marks : 10)

Answer the following questions :

2×5=10

1. What is the use of pointer?
2. What do you mean by sorting?
3. Convert $A+B/C \cdot D$ to prefix expression.
4. Write the advantages of linked list over an array.
5. What is minimum spanning tree?

(PART : B—DESCRIPTIVE)

(Marks : 50)

The figures in the margin indicate full marks for the questions

1. (a) Explain dynamic memory allocation with different functions which can be used for managing a memory allocation. 5

- (b) Define data structure. What are the different types of data structures? Give an example each. 5

OR

- (c) Explain time and space efficiency of algorithm with example. 5

- (d) Write a C program for the use of array of pointers. 5

2. (a) Write a C program to implement sequential search for unsorted number. 5

- (b) Explain binary search with appropriate example. 5

OR

- (c) Suppose a sequence of numbers is given as 5, 1, 6, 9, 22, 10, 7, 45. Trace the operation steps for sorting the series using—

(i) insertion sort;

(ii) bubble sort. 5+5=10

3. (a) Explain stack and its operations with an algorithm. 5

- (b) Write a C functions code of insert() and delete() operations for circular queue. 5

OR

- (c) Briefly explain D-queue with diagram. 4

- (d) Convert infix expression $A+(B-C)/C * E$ into post-fix expression using stack. 6

4. (a) How is the structure of doubly linked list different from singly linked list? Write a C function code for inserting and deleting elements in a specified position in a doubly linked list. 10

OR

- (b) Write a C programming code for display function and insertion and deletion of elements at a given position in a singly linked list. 10

5. (a) Construct a binary search tree by inserting the following sequence of numbers : 5

10, 12, 5, 4, 20, 8, 7, 15

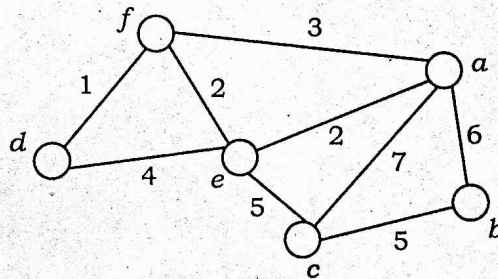
- (b) Construct a binary tree from the given traversal : 5

In-order traversal : 4, 2, 1, 7, 5, 8, 3, 6

Post-order traversal : 4, 2, 7, 8, 5, 6, 3, 1

OR

- (c) Find the shortest path by using Kruskal's algorithm. 5



- (d) Find the DFS and BFS from the following : 5

