

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 $A+B/C*D$ 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

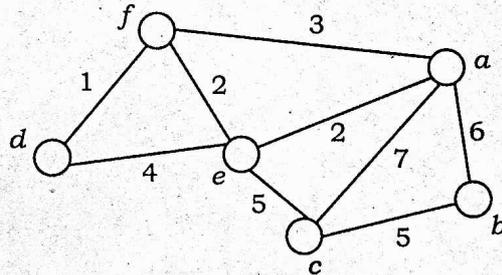
(b) Construct a binary tree from the given traversal : 5

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

