

7237

BOARD DIPLOMA EXAMINATION, (C-20)  
NOVEMBER/DECEMBER—2022  
DCME – THIRD SEMESTER EXAMINATION  
DATA STRUCTURES THROUGH C

Time : 3 hours ]

[ Total Marks : 80

**PART—A**

3×10=30

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms ‘time complexity’ and ‘space complexity’.
2. Illustrate linear searching with an example.
3. Apply selection sort technique to sort the elements 3, 2, 6 and 8.
4. Give the structure of a node in doubly linked list.
- \* 5. List any three advantages of linked lists over arrays.
6. List any three applications of stacks.
7. Define the terms PUSH and POP with respect to LIFO data structure.
8. Define queue by mentioning any two operations on queues.
9. List any three applications of trees.
10. Define the terms tree, degree of node and height of the tree.

\*

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **eight** marks.  
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

**11.** (a) Use the concept of an array to write a program for binary search for non-sorted sequence.

**(OR)**

(b) Apply the concept of insertion sort on (3, 5, 1, 7, 8, 9, 12) and print the odd iteration sequences.

**12.** (a) Use the concept of an array to write a program for circular queues.

**(OR)**

(b) Build an ordinary queue with linked list and perform all the operations.

**13.** (a) Build an equivalent postfix expression of the given infix  $x \wedge y / (5 * z) + 2$ .

**(OR)**

(b) Use stack to evaluate the given postfix expression "53 + 62/\*35\* +".

**14.** (a) Write a program for circular queues using arrays.

**(OR)**

(b) Use recursion concept and write the pseudocode for reversing an ordinary queue.

**15.** (a) Construct a binary search tree for the values 10, 20, 34, 56, 68, 98, 33, 45 and find out the (i) root node, (ii) leaf nodes, (iii) height of the tree and (iv) internal nodes.

**(OR)**

(b) Construct a binary tree for the values 24, 22, 54, 11, 33, 68, 89, 91, 12, 3 and 67, and give the inorder, preorder and postorder traversals.

\*

## PART—C

10×1=10

\*

- Instructions :** (1) Answer the following question.  
(2) The question carries **ten** marks.  
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 16.** Design a binary search tree with the values 10, 30, 20, 40, 50, 60, 80, 90, 78, 99 nodes. Show the modified tree after inserting 1, 2 and 3 nodes and after deleting 20, 40, 50. Finally display the resultant tree nodes from root to leaves and display the post order traversal of the final tree.

★★★

\*

\*