16|11|19

VCD F.Y.B.SC. (CS) Data Structures SEM-II 75-MARKS $2^{1/2}$ HRS

N.B 1) **All questions are compulsory.**
2) **Figures to the right indicate marks.**
3) **Illustrations, in-depth answers and diagrams will be appreciated.**
4) **Mixing of sub-questions is not allowed.**

Q.1 Attempt All(Each of 5 marks) (15M)

(a) **Multiple Choice Questions.**

1. The elements of an array are stored successively in memory cells because
   A. the architecture of computer memory does not allow arrays to store other than serially
   B. by this way computer can keep track only the address of the first element and the addresses of other elements can be calculated
   C. both of above
   D. none of above
2. Which of the following algorithmic paradigm is used in the merge sort?
   A. Dynamic Programming B. BackTracking
   C. Greedy method D. Divide and Conquer
3. The data structure required to evaluate a postfix expression is
   A. queue B. stack C. array D. linked-list
4. The pre-order and post order traversal of a Binary Tree generates the same output. The tree can have maximum
   A. Three nodes B. Two nodes
   C. One node D. Any number of nodes
5. What Member function places a new node at the end of the linked list?
   A. addNode B. appendNode
   C. DisplayNode D. StructNode

(b) **Fill in the blanks.**

(queue, dequeue, 15 ,"push" and "pop" , stack, 16, referential structure, nodes)

1) The term is _____ related to the Stack.
2) The_____ process removes data from the front of the single ended queue.
3) 6, 8, 4, 3, and 1 are inserted into a data structure in that order. An item is deleted using only a basic data structure operation. If the deleted item is a 1, the data structure cannot be a _____.
4) _____is used to implement linked list.
5) _____ is the maximum possible number of nodes in a binary tree at level 3.

(c) **Short Answers.**

1) Define Container.
2) Define Complexity.
3) Define Circular Linked List.
4) Define Binary Tree.
5) What are different operations on data structures?

Q.2 Attempt the following. (Any THREE)(Each of 5 Marks) (15M)

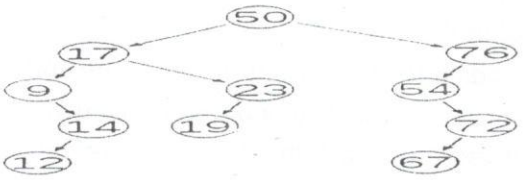
a) What is Abstraction? Explain with its different types.
b) Write short note on Bag ADT.
c) What is array? Explain working of 2D- Array.
d) How to create python list and insert new item at the end of it?
e) Short note on Big-O notation.
f) What is Binary search? Consider following list of items and write steps to search element 25.
12,34,60,35,20,25,70,45,12,23,56.

Q.3 Attempt the following. (Any THREE)(Each of 5 Marks) (15M)

a) Explain representation of Linked List? Write python code for traversal and searching.
b) Write short note on Polynomial ADT.
c) What is Stack? Explain working of insertion and deletion.
d) Consider following postfix expression and check weather its valid or invalid using stack implementation. AB*CD+EF-
e) Write a program to implement queue insertion and deletion.
f) What is Multi-Linked List? Explain working with suitable example.

Q.4 Attempt the following. (Any THREE)(Each of 5 Marks) (15M)

a) What is recursion? What are properties of Recursion? Write code for calculating factorial using recursion.
b) What is Hashing? Explain clustering.
c) Sort given set of elements using merge sorting technique.
15,20,4,28,11,18,30,25,3
d) For a given tree perform inorder, preorder and postorder traversal.



e) Draw a binary tree using following traversal techniques
Inorder: ABDFECGH
Preorder: FDBEAGCH
f) What is Heap? What are different types of Heap representation?

Q.5 Attempt the following. (Any THREE)(Each of 5 Marks) (15M)

a) Explain iterator ADT with example.

b) How to build linked list using Tail reference? Write a program for appending node.

c) Represent following expression using tree.

X=(-b+(b^2-4*a*c)^0.5)/(2*a)

d) What is sorting? Consider following list of items and write step by step moves to sort this list using Bubble Sort.

50, 30, 60, 20, 10, 40, 80, 70

e) Generate Heap using following sequence.

16,14,10,12,9,15,1,2,11,7,3,17,19