

**MASTER OF COMPUTER APPLICATION
FIRST SEMESTER
ADVANCED DATA STRUCTURE
MCA-102**

**SET
A**

[USE OMR FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Time: 30 min.

(Objective)

Marks: 20

1X20=20

Choose the correct answer from the following:

- Which data structure allows traversal in both directions?
 - Singly linked list
 - Doubly linked list
 - Circular linked list
 - Stack
- Which of the following data structures uses FIFO (First In, First Out) method?
 - Queue
 - Stack
 - Tree
 - Graph
- In a singly linked list, each node contains:
 - Data and previous pointer
 - Data only
 - Data and next pointer
 - Address only
- In an array, elements are stored:
 - Randomly in memory
 - Sequentially in memory
 - Only at even addresses
 - None of these
- A tree with n vertices has how many edges?
 - $n+1$
 - $n/2$
 - $2n$
 - $n-1$
- In a rooted binary tree, each node has at most:
 - One child
 - Two children
 - Three children
 - Unlimited children
- When deleting a node with two children in a BST, it is replaced by:
 - Its left child
 - Its right child
 - Its inorder successor or predecessor
 - None of the above
- Which of the following is false about a binary search tree?
 - The left child is always lesser than its parent
 - The right child is always greater than its parent
 - The left and right sub-trees should also be binary search trees
 - In order sequence gives decreasing order of elements
- The adjacency matrix of a simple graph with n vertices is of size:
 - $n \times n$
 - $n \times (n-1)$
 - $(n-1) \times (n-1)$
 - $2n \times 2n$

10. A path matrix represents:
 - a. The number of edges between vertices.
 - b. Whether a path exists between two vertices
 - c. The degree of each vertex
 - d. The adjacency relation of vertices
11. What is the maximum number of swaps that can be performed in the Selection Sort algorithm?
 - a. 1
 - b. $n-1$
 - c. n
 - d. $n+1$
12. The adjacency list representation of a graph uses:
 - a. A 2D array
 - b. A single list for all edges
 - c. A matrix of edges
 - d. A linked list for each vertex
13. Bubble sort repeatedly:
 - a. Merges two sublists
 - b. Partitions the array
 - c. Swaps adjacent elements if they are in the wrong order
 - d. Builds a heap
14. The highest level in the hierarchy of data organization is called
 - a. Data bank
 - b. Data base
 - c. Data file
 - d. Data record
15. Quick sort uses which algorithmic paradigm?
 - a. Dynamic programming
 - b. Divide and conquer
 - c. Greedy approach
 - d. Backtracking
16. Consider a complete graph T with 4 vertices. The graph T has ____ spanning trees.
 - a. 4
 - b. 8
 - c. 12
 - d. 16
17. An organized logical sequence of records is called
 - a. file
 - b. organization
 - c. scrubbing
 - d. sequencing
18. Files are logically partitioned into a unit of fixed-length known as
 - a. sectors
 - b. tracks
 - c. segments
 - d. blocks
19. The record is stored in a sequence, i.e., one after the other, using the ____ Method.
 - a. Pile File
 - b. Sorted File
 - c. Both A and B
 - d. None of the above
20. The pivot element in Quick Sort is used to:
 - a. Divide the array into two parts
 - b. Sort elements directly
 - c. Merge two arrays
 - d. Build a heap

(Descriptive)

Time : 2 hrs. 30 min.

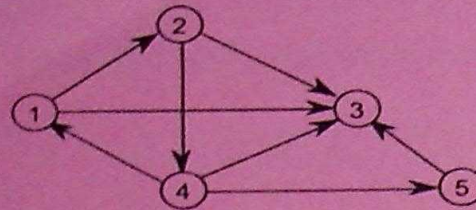
Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a) Briefly explain field, record and file in file structure. 3+4+3=10
b) Briefly explain the insertion of new records in Sequential File Organization.
c) Explain the advantages and disadvantages of sequential file organization.
2. Write a c program to implement binary search algorithm. 10
3. Construct a binary search tree by inserting the following numbers from left to right- 11, 6, 8, 19, 4, 10, 5, 17, 43, 49, 31 and delete 11 from the tree by using either inorder successor/predecessor. Explain all the steps 10
4. Write a C program to implement Enqueue and Dequeue operation on Queue using array. 10
5. Write a Doubly Linked list program to perform the below operations. 3+3+4=10
 - 1.Insert at beginning
 - 2.Insert at last
 - 3.Random Delete
6. Rearrange following numbers using insertion sort: 10
10, 6, 3, 7, 17, 26, 56, 32, 72. Write a c program to implement it.

7. For the graph of figure below

2+2+6=10



- Find its adjacency matrix.
- Find its adjacency list.
- Find its path matrix.

8. Briefly explain Stack and Queue. Differentiate between Stack and Queue.

5+5=10

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