

**MASTER OF COMPUTER APPLICATION
FIRST SEMESTER [SPECIAL REPEAT]
DATA STRUCTURE
MCA-102**

**SET
A**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Time: 30 mins.

(Objective)

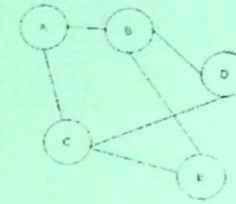
Marks: 20

Choose the correct answer from the following:

1 × 20 = 20

- Data structure that contains a relationship between a pair of elements, that is not necessarily hierarchical in nature:
 - Graph
 - Tree
 - Array
 - String
- What is the output of selection sort after the 2nd iteration given the following 16,3,46,9,28,14
 - 3 9 46 16 28 14
 - 3 9 46 28 16 14
 - 3 9 14 16 28 46
 - 3 9 46 16 14 28
- Which of the following is also called First In First Out system?
 - Queue
 - Stack
 - Array
 - Graph
- Which of the following is not a primitive data structure?
 - Arrays
 - Integer
 - Boolean
 - Character
- A binary tree whose every node has either zero or two children is called:
 - Complete binary tree
 - Binary search tree
 - Skewed Binary Tree
 - Degenerate or Pathological Tree
- A connected graph T without any cycles is called:
 - Tree
 - Loop
 - List
 - None of the above
- LIFO mechanism is used in:
 - Stack data structure
 - Queue data structure
 - Linked list data structure
 - None of the above
- What do you call the selected key in Quick sort?
 - Pivot key
 - Outer key
 - Inner key
 - Partition key
- Let there be an array of length 'N', and selection sort is used to sort it, how many times a swap function is called to complete the execution?
 - N-1 times
 - N times
 - N log N times
 - N/2 times

10. For the given graph (G), which of the following statements is true?



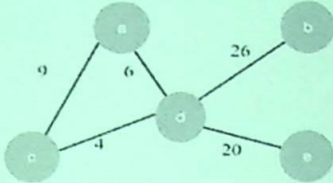
- a. The vertex connectivity of the graph is 2 b. G is a complete graph
 c. The edge connectivity of the graph is 1 d. None of the above
11. The number of edges from the root to the node is called _____ of the tree.
 a. Depth b. Height
 c. Length d. Width
12. What is a full binary tree?
 a. Each node has exactly zero or two children b. Each node has exactly two children
 c. All the leaves are at the same level d. Each node has exactly one or two children
13. In a full binary tree if number of internal nodes is I, then number of leaves L are?
 a. $L = I + 1$ b. $2 * I$
 c. $L = I - 1$ d. $L = 2 * I - 1$
14. A connected planar graph having 6 vertices, 7 edges contains _____ regions.
 a. 3 b. 15
 c. 4 d. 2
15. Which of the following is false in the case of a spanning tree of a graph G?
 a. It can be either cyclic or acyclic b. It is a sub graph of graph G
 c. It includes every vertices of G d. It is a tree that spans G
16. Consider a complete graph G with 4 vertices. The graph G has _____ spanning trees.
 a. 16 b. 64
 c. 8 d. 128
17. Consider the graph M with 3 vertices. Its adjacency matrix is shown below.

$$M = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

Which of the following is true?

- a. Graph M has 3 distinct minimum spanning trees, each of cost 2 b. Graph M has no minimum spanning tree
 c. Graph M has a unique minimum spanning trees of cost 2 d. Graph M has 3 spanning trees of different costs

18. Consider the graph shown below. Which of the following are the edges in the MST of the given graph?



- a. (a-d)(d-c)(d-b)(d-e)
b. (a-c)(c-d)(d-b)(d-b)
c. (c-a)(a-d)(d-b)(d-e)
d. (c-a)(a-d)(d-c)(d-b)(d-e)
19. Which of the following is false?
- a. The spanning trees do not have any cycles
b. MST have $n - 1$ edges if the graph has n edges
c. Edge e belonging to a cut of the graph if has the weight smaller than any other edge in the same cut, then the edge e is present in all the MSTs of the graph
d. Removing one edge from the spanning tree will not make the graph disconnected
20. Which of the following is true?
- a. Prim's algorithm initializes with an edge
b. Prim's algorithm initializes with a forest
c. Prim's algorithm initializes with a vertex which has smallest edge
d. Prim's algorithm initializes with a vertex

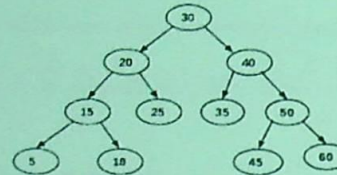
(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

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

1. What is Data Structure? Explain different types of Data Structures along with suitable example. 10
2. What are the difference between Array and Linked list? Explain the operation of traversing linked list. 5+5=10
3. Define sorting techniques and its type. Sort the following array using bubble sort algorithm.
Array=13,32,26,35,10 5+5=10
4. Answer the following questions: 5+5=10
 - a) State the difference between Graph data structure and Tree data structure.
 - b) What is the output obtained after preorder, inorder and postorder traversal of the following tree?



5. What is a binary tree? What is the maximum numbers of binary tree possible with 3 labelled nodes? Explain the following term with respect to binary trees. 2+2+3+3=10
 - i) Strictly Binary tree
 - ii) Complete binary tree
6. Define a graph. Build a Binary Search tree with the following values. {15,20,24,10,13,7,30,36,25,42,29} 3+7=10
7. What is algorithm? Why do we use an asymptotic notation in the study of algorithm? Explain the meaning of worst case analysis and best case analysis and average case analysis with an example. 4+3+3=10
8. What is Heap Data Structure? Explain different operations of Heap data structure. Draw Max Heap and Min Heap from the following elements. 2+3+5=10
Input → 35 33 42 10 14 19 27 44 26 31

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