

(FOR THE CANDIDATES ADMITTED

DURING THE ACADEMIC YEAR 2021-22 ONLY)

SUB CODE 21 UCT 205

REG.NO :

**N.G.M. COLLEGE (AUTONOMOUS): POLLACHI**

**END-OF-SEMESTER EXAMINATIONS: JULY – 2022**

**B.Sc.-COMPUTER TECHNOLOGY**

**MAXIMUM MARKS: 70**

**II SEMESTER**

**TIME: 3 HOURS**

**PART - III**

**DATA STRUCTURES**

**SECTION - A**

**(10 X 1 = 10 MARKS)**

**ANSWER THE FOLLOWING QUESTIONS.**

**MULIPLE CHOICE QUESTIONS.**

**(K1)**

**(Qn. No. 1 - 5)**

1. Choose a correct statement about C language arrays\_\_\_\_\_
  - a) An array size can't be changed once it is created.
  - b) Array element value can be changed any number of times.
  - c) To access Nth element of an array *arr*, use *arr[n-1]* as the starting index is 0.
  - d) All the mentioned.
2. Select the following option which doesn't follow the stack principle\_\_\_\_\_.
  - a) Stack of books in library
  - b) Vehicles on tollgates
  - c) Wearing/removing bangles
  - d) Undo mechanism in MS Word
3. The minimum number of fields in each node of a doubly linked list is \_\_\_\_\_.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
4. A graph is a tree if and only if graph is \_\_\_\_\_.
  - a) Contains no cycles
  - b) Directed graph
  - c) Complete graph
  - d) Completely connected
5. Which one of the following is the worst-case time complexity for quick sort?
  - a)  $O(\log n)$
  - b)  $O(1)$
  - c)  $O(n^2)$
  - d)  $O(n)$

**ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES**

**(K2)**

**(Qn. No. 6 - 10)**

6. What is sparse matrix? Give an example.
7. Define priority queue with an example.
8. Write a piece of code to represent a single node in doubly linked list.
9. What is complete binary tree?
10. Recall any four types of indexing.

(CONTD.....2)

**SECTION – B****( 5 X 4 = 20 MARKS)**

**ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.  
(Qn. No. 11 to 15) 10 questions (a & b) – 2 questions from each unit. (K3)**

11. a) Illustrate the operations performed on an array.

(OR)

b) Recall the steps involved in the development of an algorithm.

12. a) What are the operations that can be performed on a stack? Write a pseudocode to pop an element from the stack.

(OR)

b) How will you implement insert operation on a circular queue?

13. a) What are the advantages of circular linked list over singly linked list?

(OR)

b) How will you delete a node in a singly linked list?

14. a) Write a brief note on linked representation of binary trees.

(OR)

b) Distinguish between Eulerian graph and Hamiltonian circuit.

15. a) Write a note on unordered linear search.

(OR)

b) How will you analyse the performance of two-way merge sort?

**SECTION – C****(4 X 10 = 40 MARKS)**

**ANSWER ANY FOUR OUT OF SIX QUESTIONS**

**(16<sup>th</sup> QUESTION IS COMPULSORY AND ANSWER ANY THREE**

**QUESTIONS (FROM Qn. No: 17 to 21)**

**(K4 (Or) K5)**

16. Consider an array of elements,  $X = \{72, 23, 12, 65, 87, 52, 33, 46\}$ . Sort these elements using quick sort. Also discuss the time complexity of quick sort.

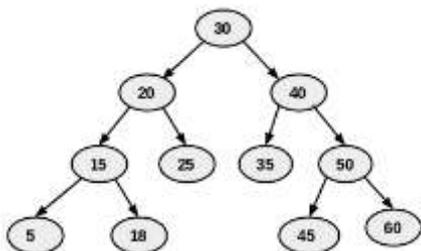
17. How are arrays represented in memory? Explain with suitable diagrams.

18. Evaluate the postfix expression of  $A + B * C \uparrow D$  for  $A = 2, B = 1, C = 2$  and  $D = 3$ , using stack. Show the postfix conversion too.

19. Elaborate the following:

- Insert a node to the linked list after a specific position on a singly linked list.
- Insert node X to the right of node Y in a headed circular doubly linked list P.

20. Perform binary tree traversal on the following tree.



21. What is the structure of ISAM file? Illustrate a schematic diagram of a simple ISAM file.