Sub. Code 7BCE3C1

## B.Sc. DEGREE EXAMINATION, NOVEMBER 2021.

## Third Semester

## **Computer Science**

## DATA STRUCTURES AND COMPUTER ALGORITHMS

(CBCS - 2017 onwards)

Time: 3 Hours Maximum: 75 Marks

**Part A**  $(10 \times 2 = 20)$ 

Answer all questions.

- 1. Define data structure. Give an example.
- 2. Give an example for single and two dimensional arrays.
- 3. Give an application for stack and queue.
- 4. Draw a circular queue and list the advantage of circular queue.
- 5. Differentiate tree and binary tree.
- 6. Draw an expression tree and state its advantage.
- 7. Define the terms Finiteness and Definiteness with respect to an algorithm.
- 8. State the time complexity of merge sort and quick sort.
- 9. Define Connected graph and give an example.
- 10. State the objective function and the constraints involved in knapsack problem.

Part B

 $(5 \times 5 = 25)$ 

Answer all questions, choosing either (a) or (b).

11. (a) Explain insertion and deletion in single linked list

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- (b) Explain how to perform search and reversal in a doubly linked list.
- 12. (a) Explain how stack can be implemented using arrays and linked list.

Or

- (b) Explain insertion and deletion operations on queue with suitable example.
- 13. (a) Explain how the Inorder successor can be found in a Threaded binary tree.

Or

- (b) Construct the binary tree from the following preorder and inorder traversal sequence: Preorder: ABCDEF Inorder: CBAEDF.
- 14. (a) Sort the following set of elements using merge sort. Provide stepwise explanation. 12, 24, 8, 71, 4, 23, 6, 80.

Or

- (b) Write an algorithm that performs binary search. Analyse the algorithm with respect to space and time complexity
- 15. (a) Explain Kruskal algorithm with an example.

Or

(b) Explain the graph traversal techniques with example.

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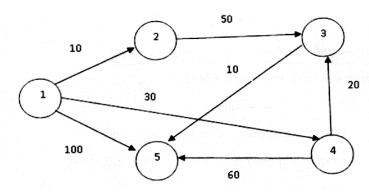
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Part C

 $(3 \times 10 = 30)$ 

Answer any three questions.

- 16. Explain with example how insertion and deletion can be performed on a circular linked list under the following three conditions.
  - (a) Element is to be inserted/deleted at the beginning
  - (b) Element is to be inserted/deleted before a particular element
  - (c) Element is to be inserted/deleted at the end.
- 17. Write the algorithm to convert infix to postfix expression using stacks. Explain with an example.
- 18. Explain the various ways of representing a binary tree and explain the various tree traversal techniques.
- 19. Explain Strassen's Matrix multiplication and mention its advantage.
- 20. Apply Dijsktra's algorithm for the following graph and find the shortest path from vertex 1 to all other vertices.



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