

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER MCA DEGREE EXAMINATION (R), DECEMBER 2023**(2021 SCHEME)****Course Code: 21CA102****Course Name: Advanced Data Structures****Max. Marks: 60****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Write short note on disjoint set operations.
2. Assume the stack is represented using linked list. Write an algorithm for the following operations i) push ii) pop iii) display.
3. What is suffix tree?
4. Define splaying with an example.
5. Explain the properties of binomial heap with an example.
6. Differentiate max heap and min heap.
7. Explain topological sorting.
8. Write Dijkstra's algorithm with complexity.
9. What are the types of block chain based on the classification according to different application scenarios and network admission mechanism?
10. What is contract data?

PART B***(Answer one full question from each module, each question carries 6 marks)*****MODULE I**

11. Write an algorithm to perform the following operations in doubly linked list
 - i) Insert a new node after a given node
 - ii) delete the last node
 - iii) count the number of elements in the list.(6)

OR

12.
 - a) Write the steps involved in insertion of circular linked list. (3)
 - b) Explain any three ways of representing sets in memory. (3)

MODULE II

13. Define red black tree and write its properties. Explain insertion and deletion operations in red black tree. (6)

OR

- 14. a) Show the result of inserting a minimum of 15 items in an initially empty B-Tree of order 5 (Can select any random numbers as item) (4)
- b) Define balanced binary search tree. (2)

MODULE III

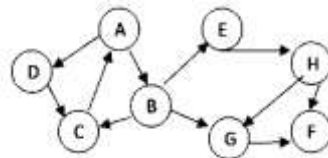
- 15. Explain the algorithm to extract minimum key in a fibonacci heap with an example. (6)

OR

- 16. Explain any two mergeable operations. (6)

MODULE IV

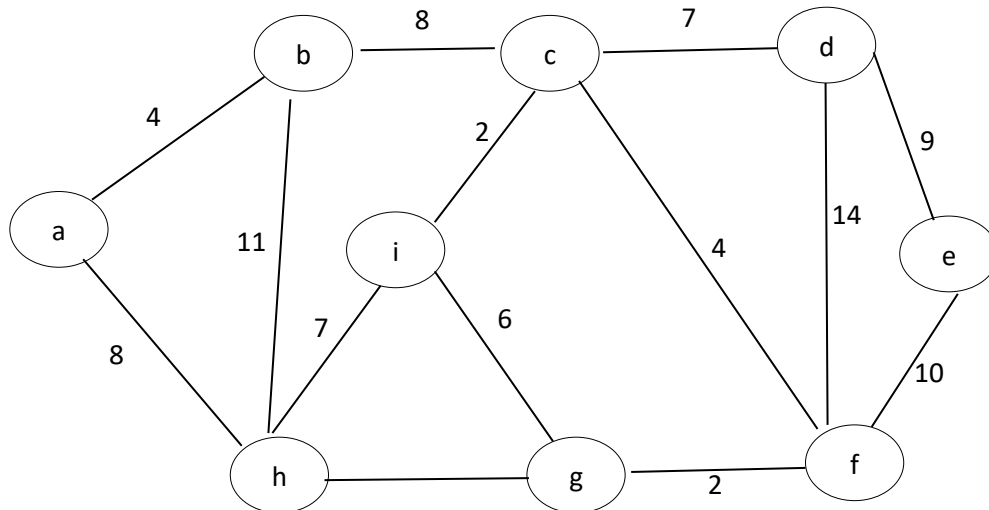
- 17. Consider the following graph. If there is ever a decision between multiple neighbor nodes in the BFS or DFS algorithms, assume we always choose the letter closest to the beginning of the alphabet first. (6)



In what order will the nodes be visited using a breadth first search.
 In what order will the nodes be visited using a depth first search.

OR

- 18.



Using Prim’s algorithm to construct a minimum spanning tree starting with node ‘a’, find out the best possible order in which the edges would be added to construct the minimum spanning tree. (6)

MODULE V

- 19. Define hashing. Explain the various methods for hashing with examples. (6)

OR

- 20. Describe any three collision resolution techniques. (6)