Register No.:   ....   Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER INTEGRATED MCA DEGREE EXAMINATION (S), AUGUST 2023
(2020 SCHEME)

Course Code: 20IMCAT308

Course Name: Design & Analysis of Algorithms

Max. Marks: 60   **Duration: 3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. What do you mean by the space complexity of an algorithm? Explain with an example.
2. Solve the following recurrence relation using Master's theorem

$$T(n) = 2T(n/4) + n^{0.51}.$$

3. Differentiate Prim's and Kruskal's algorithm for finding minimal spanning tree.
4. Write down the control abstraction of divide and conquer approach.
5. Compare and contrast dynamic programming and greedy method.
6. State the principle of optimality.
7. Discuss about N^2 -1 puzzle problem.
8. Explain the concept of state space tree.
9. Distinguish between deterministic and nondeterministic algorithm.
10. Write short note on vertex cover problem.

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

MODULE I

11. Explain various strategies for solving recurrence equations using appropriate examples.   (6)

OR

12. Illustrate the big oh, theta, and omega asymptotic notations with example.   (6)

MODULE II

13. Analyze and explain quick sort algorithm. Sort the following elements 44, 22, 33, 77, 11, 55, 66.   (6)
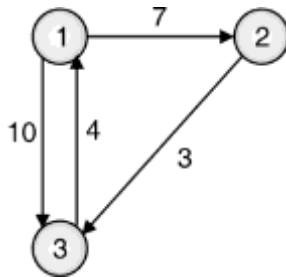
OR

14. Explain knapsack problem. Given the capacity of knapsack is 60, find out the optimal solution using fractional knapsack. (6)

Item	A	B	C	D	E
Weight	5	10	15	22	25
Profit	30	40	45	77	90

MODULE III

15. Find the shortest path between all pairs in a given weighted graph. (6)

OR

16. Discuss about travelling salesman problem in detail. (6)

MODULE IV

17. Describe how backtracking algorithm helps to solve sum of subset problem. (6)

OR

18. Discuss 4 queens problem and draw the state space tree for 4 queen's problem. (6)

MODULE V

19. Explain the concept of P class, NP class and NP complete class problems in detail. (6)

OR

20. Prove that clique problem is NP complete. (6)

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