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Reg. No.....

Name.....

M.Sc. (COMPUTER SCIENCE) DEGREE (C.S.S) EXAMINATION FEBRUARY 2025

Third Semester

MCS3C3—DESIGN AND ANALYSIS OF ALGORITHMS

(2018 Admissions—First Mercy Chance/ 2017 Admissions—Second Mercy Chance, 2016 Admissions—Third Mercy Chance and 2015 Admissions—Last and Final Special Mercy Chance)

Time : Three Hours Maximum Weight : 30

Part A (Short Essays)

Answer any **five** *questions.*

Each question carries a weight of 1.

1. What do you mean by exact and approximation algorithm ?
2. List out the steps that need to design an algorithm.
3. What is Knapsack problem ?
4. Define dynamic programming.
5. What are the steps required to develop a greedy algorithm ?
6. Define minimum cost spanning tree.
7. What are the requirements that are needed for performing Backtracking ?
8. State 8 - Queens problem.

(5 × 1 = 5)

Part B (Short Essays)

Answer any **five** *questions.*

Each question carries a weight of 2.

9. Write about Asymptotic notations and analysis.
10. Write Partition Algorithm for Quick Sort. Analyse its time complexity.

Turn over

11. Write about the Kruskal's algorithm and give example.

12. Write an algorithm for Knapsack problem using greedy strategy.

13. Write an algorithm and explain how to determine biconnected components.

14. Define P, NP, NP complete and NP-Hard problems. Give examples of each,

15. Write abou the approximation algorithm for Traveling Salesman Problem.

16. Write an algorithm for the graph coloring.

$(5 \times 2 = 10)$

Part C (Long Essays)

Answer any **three** *questions.*
Each question carries a weight of 5.

17. What is recurrence ? Solve recurrence equation $T(n) = T(n-1) + n$ using forward substitution and backward substitution method.

18. Give a divide and conquer based algorithm to find the i^{th} smallest element in an array of size n. Trace your algorithm to find 3rd smallest in the array.

    A = {10, 2,5, 15, 50, 6, 20}.

19. Write and explain Prim's algorithm to construct a minimum cost spanning tree.

20. Explain multistage graphs with suitable examples.

21. Explain LC Branch and Bound and FIFO Branch and Bound.

22. Write a detailed note on Optimal randomized algorithms.

$(3 \times 5 = 15)$