

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2022  
(Regular/Improvement/Supplementary)

COMPUTER SCIENCE  
FCSS2C06-DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *four* questions. Each carries 2 weightage.

1. Give two examples for combinatorial problem.
2. Compare between exact and approximate algorithms.
3. Explain the Divide and Conquer approach to algorithm design.
4. State and explain Masters Theorem.
5. Explain the iteration method of problem solving with example.
6. Illustrate P vs NP problem with an example.
7. What is Parallel prefix computation? Explain its characteristics and applications?

(4×2 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries 3 weightage.

8. Demonstrate any two methods of specifying an algorithm.
9. a) Define growth of functions and various asymptotic notations used. Arrange the functions below from lowest asymptotic order to highest asymptotic order:  
 $2^n, n^2, n^3, n \log n, n^2 + \log n$   
b) Find the solution of the following recurrence relation:  $T(n) = 8T(n/2) + 3n^2$   
where n is an integer power of 2 and greater than 1.
10. Discuss the dynamic programming solution to longest common subsequence (LCS) problem. Explain with example.
11. With suitable example, illustrate “Solving of recurrence relations “using the substitution method.
12. Define the classes of problems P, NP and NP complete. How are they related to each other?
13. Explain NP-Completeness reductions for Travelling Salesman problem.
14. Define symmetry breaking. Describe how fast symmetry breaking can be achieved with an example

(4×3 = 12 weightage)

(P.T.O.)

**Section C: Essay questions. Answer any *two* questions. Each carries 5 weightage.**

15. Explain Branch and Bound Design Technique. Devise an algorithm for Knapsack problem using Branch and Bound Technique. Explain with example.
16. Analyze the merge sort algorithm. Illustrate the steps in merge sort using the dataset: 50,40,20,70,15,35,20,60.
17. Discuss the following with respect to parallel algorithms: Time complexity, speed up and scalability.
18. Explain Euler's tour technique. Discuss the steps in constructing the Euler's tour representation.

**(2×5 = 10 weightage)**