

THIRD Semester M.C.A. (One Time Measure) Examination August -2021

**(Y2K5 Scheme)
COMPUTER SCIENCE**

3MCA-2 : Design and Analysis of Algorithms

Time : 3 Hours

Max. Marks : 80

Instruction : Answer any five questions choosing at least two from each Part.

PART – A

1. a) Discuss important problem types. 8
b) Give an account of general framework for analysis of algorithms. 8
2. a) Explain different asymptotic notations. What are the basic efficiency classes ? Enumerate. 8
b) Explain the mathematical analysis of non-recursive algorithms with an example. 8
3. a) Explain the brute-force based algorithm for finding the closest pair of points in two dimensional space. 8
b) Write quick sort algorithm. What is the upper bound on its efficiency ? Comment on the specificity of the input for the algorithm. 8
4. a) Compare and contrast brute-force based algorithm and Strassen's algorithm for matrix multiplication. 8
b) What is the basic principle behind the decrease and conquer technique ? What are its variations ? Write a decrease by a constant variation based algorithm to compute a^n . Comment on its time complexity. 8

PART – B

5. a) Explain the Horner's rule for evaluating a polynomial. Evaluate the following polynomial. $P(x) = 7x^5 + 4x^3 + 7x^2 + 6x + 9$ at $x = 3$. 8
b) Produce Floyd's algorithm for all the pairs shortest paths problem. Investigate its time complexity. 8

P.T.O.

6. a) Explain sorting by distribution counting algorithm. Comment on the specificity of the inputs for the algorithm and its efficiency. 8
- b) Explain Horspool's algorithm for string matching. How does it score over brute-force method? 8
7. a) Discuss Prim's algorithm for constructing a minimum spanning tree for a graph find its complexity. 8
- b) Explain Branch and bound technique to solve the assignment problem for the following instance of the problem 8

	Job 1	Job 2	Job 3	Job 4
Person 1	10	5	4	7
Person 2	6	4	3	7
Person 3	5	8	3	8
Person 4	9	6	8	4

8. Write short notes on the following :

(4×4 = 16)

- a) Topological sorting
 - b) TSP problem
 - c) 4-queens problem
 - d) Selection sort.
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