Reg. No. : | | | | | | | | | | |

Question Paper Code: 31424

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

Fourth Semester

Computer Science and Engineering

01UCS404 - DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. List the factors which affects the running time of the algorithm.
2. Define recurrence relation.
3. Apply the Quick sort to the list E, X, A, M, P, L, E.
4. Give the formula for Manhattan distance computation.
5. Discuss the use of Warshall's algorithm and Floyd's Algorithm.
6. Differentiate Prim's algorithm and Kruskal's algorithm.
7. Define stable marriage algorithm.
8. Define Max-flow Min-cut theorem.
9. List the lower bounds for sorting, searching and multiplication.
10. Give examples for NP complete problems.

PART - B (5 x 16 = 80 Marks)

11. (a) Give the asymptotic notations used for best case, average case and worst case analysis of algorithms and write an algorithm for finding maximum element of an array perform best, worst and average case complexity with appropriate order notations. (16)

Or

(b) Solve the following recurrence relations (16)

a) $x(n)=x(n-1)+5$ for $n > 1$ $x(1)=0$

b) $x(n)=3x(n-1)$ for $n > 1$ $x(1)=4$

c) $x(n)=x(n-1)+n$ for $n > 0$ $x(0)=0$

d) $x(n)=x(n/2)+n$ for $n > 1$ $x(1)=1$ (solve for $n=2^k$)

e) $x(n)=x(n/3)+1$ for $n >1$ $x(1)=1$ (solve for $n=3^k$)

12. (a) Describe sequential search and Brute force string matching using Brute force method. (16)

Or

(b) Discriminate the following solutions based on the time complexity with necessary justification

(i) Strassen's matrix multiplication (8)

(ii) Multiplication of largest integer (8)

13. (a) Apply the bottom up dynamic programming algorithm to the following instance of Knapsack Problem

Item	Weight	Value
1	7	$42
2	3	$12
3	4	$40
4	5	$25

Capacity W=10. (16)

Or

(b) Describe the Warshall's algorithm with example and analyze its efficiency. (16)

14. (a) Design the simplex method on the following problems

Maximize $p= 2x-3y=4z$

Subject to $4x-3y+z<=3$

$x+y+z <=10$

$2x+y- z<=10$ where x, y and z are non negative. (16)

Or

(b) Describe the algorithm for maximum matching in Bipartite graphs and prove the theorem with example. (16)

15. (a) Analyze the time and space complexity of backtracking routine for

(i) The n-queens problem (8)

(ii) Hamiltonian cycle problem (8)

Or

(b) Explain the following using approximation algorithm

(i) Nearest-neighbor algorithm with example (8)

(ii) Multifragment heuristic algorithm with example (8)