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Question Paper Code: 34204

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. What is an algorithm?
2. Differentiate time complexity from space complexity.
3. How divide and conquer technique can be applied to binary trees?
4. What is knapsack problem?
5. Define dynamic programming.
6. State the uses of memory functions to solve knapsack problem.
7. Define feasible solution. Give an example.
8. List the steps for simplex methods.
9. Determine the additional features required in branch-and-bound when compared to backtracking.
10. Define Hamiltonian circuit problem in an undirected graph.

PART - B (5 x 16 = 80 Marks)

11. (a) Briefly discuss the steps in designing and analyzing an algorithm. (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) Write an algorithm for Quicksort and sort the list 5, 3, 1, 9, 8, 2, 4, 7. Also find its time complexity. (16)

Or

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

(i) Strassen's matrix multiplication (8)

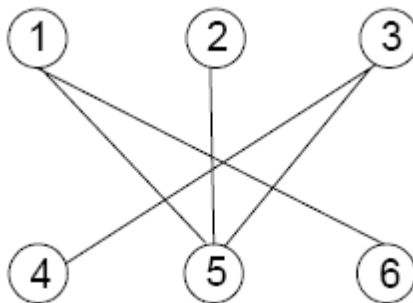
(ii) Multiplication of largest integer (8)

13. (a) What is optimal binary search tree? Write the algorithm to find the optimal binary search tree by dynamic programming. (16)

Or

(b) Write the Floyd's algorithm for solving all pair shortest path. (16)

14. (a) Apply the maximum matching algorithm to the following bipartite graphs. (16)



Or

- (b) Explain briefly about the maximum-flow problem with an 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) Draw the State-space tree of solving the four queens problem by backtracking. (16)
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