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Question Paper Code: 41244

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Computer Science and Engineering

14UCS404 - DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The main measure for efficiency algorithm are
 - Processor and Memory
 - Complexity and Capacity
 - Data and Space
 - Time and space
- The time complexity of binary search is
 - $O(1)$
 - $O(\log n)$
 - $O(n)$
 - $O(n \log n)$
- For the improvement of efficiency of quick sort the pivot can be
 - the first element
 - the mean element
 - the last element
 - None of these
- Find the odd one out from the following categories of algorithms
 - TVSP
 - N-Queens
 - 15-Puzzle
 - Bin-Packing
- The OBST algorithm in worst case takes _____ time if all $c(i, j)$'s and $r(i, j)$'s are calculated.
 - $O(\log n)$
 - $O(n^4)$
 - $O(n^3)$
 - $O(n \log n)$
- Prims algorithm is based on _____ method.
 - Dynamic programming
 - Greedy method
 - Branch and bound
 - Divide and conquer method

7. A matching that matches all the vertices of a graph is called a
- (a) Exact match
 - (b) Perfect match
 - (c) Maximum match
 - (d) Complete match
8. A directed graph is _____ if there is a path from each vertex to every other vertex in the digraph.
- (a) Weakly connected
 - (b) Strongly Connected
 - (c) Tightly Connected
 - (d) Linearly Connected
9. Which design strategy stops the execution when it find the solution otherwise starts the problem from top?
- (a) Back tracking
 - (b) Divide and conquer
 - (c) Branch and Bound
 - (d) Dynamic programming
10. N-queens problem is solved using
- (a) branch and bound
 - (b) backtracking
 - (c) both (a) and (b)
 - (d) approximation algorithm

PART - B (5 x 2 = 10 Marks)

11. Define algorithms and characteristics of algorithms.
12. State master's theorem.
13. State the principles of greedy.
14. Define Bipartite Graphs with example.
15. Differentiate NP-Hard and NP-Complete Problems.

PART - C (5 x 16 = 80 Marks)

16. (a) Write an algorithm to perform binary search on a sorted list of elements. Analyze the algorithm for the best case, average case and worst case. (16)
- Or
- (b) Write the linea search algorithm and analyse for its best,worst and average case time complexity. (16)
17. (a) Write an algorithm to perform binary search on a sorted list of elements and analyze the algorithm for the best case, average case and worst case. (16)

Or

(b) Explain quick sort algorithm with suitable example. (16)

18. (a) Define spanning tree. Discuss the design steps in prim's algorithm to construct minimum spanning tree with an example. (16)

Or

(b) Find the optimal binary search tree for $N = 6$, having keys $k_1 \dots k_6$ and weights $p_1 = 10, p_2 = 3, p_3 = 9, p_4 = 2, p_5 = 0, p_6 = 10; q_0 = 5, q_1 = 6, q_2 = 4, q_3 = 4, q_4 = 3, q_5 = 8, q_6 = 0$. (16)

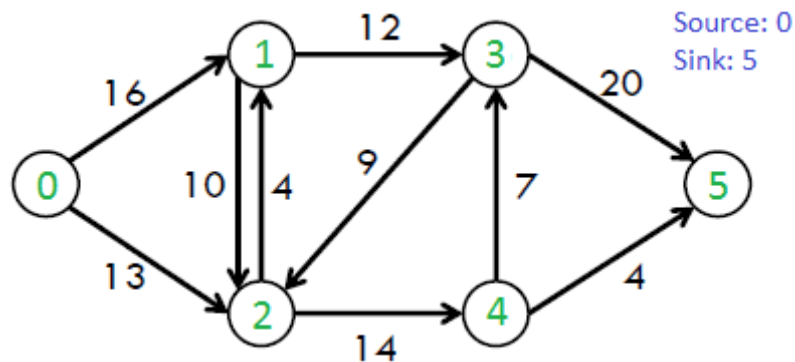
19. (a) Describe in detail about outline of simplex method. Explain geometric interpretation of Linear programming with example. Trace the simplex method on the following problems.

$$\begin{aligned} \text{Maximize } & p = 2x - 3y + 4z \\ \text{Subject to } & 4x - 3y + z \leq 3 \\ & x + y + z \leq 10 \\ & 2x + y - z \leq 10 \end{aligned}$$

where x, y and z are non negative (16)

Or

(b) Apply the Shortest-Augmenting Path Algorithm to find Maximum flow for the graph. (16)



20. (a) Write short notes on NP-Hard and NP-Completeness. (16)

Or

(b) Discuss in detail about the approximation algorithms. (16)

