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

Question Paper Code: 41244

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

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)

1. f(n)= O(g(n)) if

   (a) f(n) = O(g(n)) (b) f(n) = Ω(g(n))
   (c) f(n) = O(g(n)) and f(n) = Ω(g(n)) (d) f(n)<=c.g(n)

2. The Efficiency applied to a sequence of operations performed on the same data structure is

   (a) Best case efficiency (b) worst-case efficiency
   (c) average case efficiency (d) Amortized efficiency

3. The worst-case efficiency of quick sort is

   (a) n^2 (b) n^3 (c) n log n (d) log n

4. The time complexity for T (n) = 2T (n/8) + 1 is

   (a) $n \log_8 2$ (b) n (c) n log n (d) log n

5. Warshall's algorithm is used to find the

   (a) All pairs shortest path (b) Single source shortest path
   (c) transitive closure (d) minimum spanning tree

6. Huffman trees provide

   (a) Fixed length codes (b) variable length codes
   (c) 3 bit codes (d) ASCII codes

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 linear programming problem which does not have an optimal solution is called

(a) unbounded (b) infeasible
(c) feasible (d) non-optimal

9. A decision problem D is said to be NP-complete if

(a) It belongs to class NP (b) NP reduces to D
(c) only (a) (d) both (a) and (b)

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. What are the features/qualities/properties of an algorithm?

12. State master's theorem.

13. Differentiate dynamic programming and greedy technique.

14. What is flow conservation requirement?

15. Define the Hamiltonian circuit.

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss the fundamentals of analysis framework and notations used in algorithm design. (16)

Or

(b) If you have to solve the searching problem for a list of n numbers, how can you take advantage of the fact that the list is known to be sorted? Give separate answers for, (i) List represented as arrays (ii) List represented as linked list. Compare the time complexities of both. (16)

17. (a) (i) Write an algorithm to perform binary search. Analyze the algorithm for best case worst case and average case. (8)

(ii) Solve convex-Hull problem using Divide and Conquer. (8)

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) Define optimal binary search tree. Construct OBST for a set (a1, a2, a3, a3)= (cout, float, if, while) with probabilities p(1)=1/20, p(2)=1/5, p(3)=1/510, p(4)=1/20. (16)

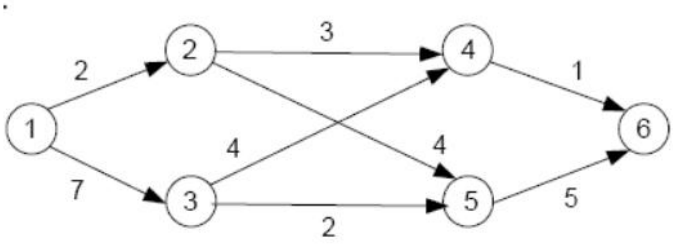
19. (a) Describe in detail about outline of simplex method. Explain geometric interpretation of Linear programming with example. Trace the simplex method on the following problems.

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) Illustrate pictorially the Ford–Fulkerson method by showing the flow augmenting paths in bold for the given flow network. (16)



20. (a) Explain about backtracking with suitable examples. (16)

Or

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

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