AAC

Chapter 1

1) Define O/Ω/ɵ notation. Is $3n^2 + 2 = O(n^2)$ Justify.
2) Order the following functions in ascending order of their growth rates justify $n^2\log n, n\log n, 10n^2, \log n, 2^n, n^3\log n$
3) Order the following functions in ascending order of their growth rates justify $n^2\log n, n\log n, 30n^2, \log n, 2^n$
4) Define theta notation show that $4n^2+3n$ is $\Theta(n^2)$
5) Write an algorithm for Tower of Hanoi problem.
6) What is TOH problem? Give its computing time in terms of recurrence relation.
7) Give different asymptotic notation in DAA. What properties satisfied by these notations?
8) What do you mean by time and space complexity.
9) Discuss time complexity of heap sort in best and worst case?
10) Show how count sort sorts sequence of numbers 4,0,2,0,2,0. What is it's time complexity?
11) Explain Count sort algorithm. What is it's time complexity?
12) Justify $4n2+3n+2=O(n^2)$.

Chapter 2

1) Explain the three variations of decrease and conquer approach and explain one algorithm for each approach.
2) Give DFS Spanning tree for following graph.

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3) Find topological sort of following graph. What is its time complexity?

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4) Write an algorithm for Topological sort. Give its time complexity.
5) What is variable size decrease and conquer? Explain with example.
6) Define tree edge, cross edge, back edge and forward in DFS spanning tree.

1) How Strassen's approach different from ordinary matrix multiplication algorithm? Give time complexity required by Strassen's algorithm.
2) Define Control Abstraction. Give control abstraction for divide and conquer strategy.
3) What do you mean by control abstraction? Write control abstraction for subset paradigm of greedy method.
4) How many multiplications and additions of reduced size are used in Strassen's matrix

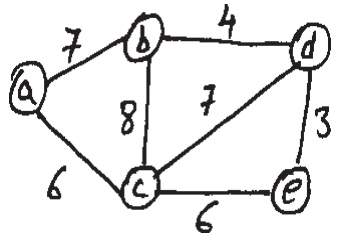
multiplication problem?

5) Sort the following array of elements by merge sort 19, 7, 14, 10, 8, 7, 9, 16, 15.
6) Show that the time complexity of Strassen's algorithm is $O(n^{2.81})$.
7) What is stable and in-place sorting? Is quick sort stable?
8) Use strassen's matrix multiplication algorithm to multiply the matrices

$$\begin{matrix} 2 & 3 \\ 4 & 5 \end{matrix} \qquad \begin{matrix} 1 & 2 \\ 2 & 3 \end{matrix}$$

Chapter 3

1) Huffman code is fixed length code justify.
2) Explain optimal storage on Tapes.
3) Give two similarities and two differences between Prim's and Kruskals' algorithm.
4) Find an optimal solution to the knapsack problem instance
   n = 3, m = 22 w = (15, 20, 21) p = (15, 22, 20).
5) Find minimum spanning tree using prim's algorithms for following fig.



6) Find minimum spanning tree using kruskal's algorithms for above graph.
7) What is an optimal Huffman code for the following set of frequencies based on the first 8 Fibonacci numbers? a:1 b:1 c:2 d:3 e :5 f:8 g:13 h:21
8) What is optimal merge pattern problem? Find optimal merge pattern for 7 files whose length are 5, 84, 53, 91, 35, 3, 11.

1) Give dynamic formulation of the longest common subsequence problem
2) Give the time complexity and space complexity of traveling salesperson problem
3) What is negative weight cycle? How it affects shortest path calculation?

4) Find Length of LCS for strings aabaabaaa, aabbbaaabb
5) Explain purging rule/dominance rule with example.
6) Find an optimal solution for 0/1 knap sack problem instance n=4,m=15, w=(2,4,6,9) and p=(10,10,12,18) using merge and purge method.

7) Give the recurrence relation the matrix chain multiplication problem for the value of optimal solution when problem is solved using dynamic programming. Compute the values for the chain A1 A2 A3 A4 where A1= 10x10, A2= 10x20 , A3= 20x5 and A4=5x10
8) Consider the knapsack instance n = 4, m = 19

(W1, W2, W3, W4) = (10, 15, 6, 9)

(P1, P2, P3, P4) = (2, 5, 8, 1)

Find optimal solution of 0/1 knapsack problem using merge and purge method.

Chapter 4

1) Give the formulation of 8 queens problem using back tracking approach.
2) Give implicit and explicit constraints in case of Graph Coloring problem with n vertices and m colors.
3) Draw the State Space Tree for m-coloring when n=3 and m=3.
4) What is Hamiltonian cycle? Find out all possible Hamiltonian cycle for the following graph.
5) What is n-queens problem? Show that there is no solution for 3 queen's problem.

1) What are the three Branch and bound approaches?
2) What do you mean by branch and bound? Define LIFO and FIFO search.
3) Why bounding functions are useful in the context of branch and bound?
4) Consider the travelling salesman instance defined by the following cost matrix. Obtain the reduced cost matrix. Which node will be next selected in LCBB approach? Also Draw state space tree.

$$\begin{pmatrix} \infty & 20 & \infty & 10 \\ 15 & \infty & 16 & 4 \\ 3 & 5 & \infty & 2 \\ \infty & 6 & 18 & \infty \end{pmatrix}$$

Chapter 4

1) Define P and NP class. State cook's theorem and explain its significance
2) What are NP-hard and NP-complete problems.
3) Give relation between P,NP and NP Hard problem using diagram.
4) State cook's theorem.