ADSA Semester Questions

ADSA DEC 2022

Q1)
A. Sort the following numbers using Quick sort: `50, 31, 71, 38, 77, 81, 12, 33`
B. Build a max heap H from the given set of numbers: `45, 36, 54, 27, 63, 72, 61, 18` . Also draw the memory representation of the heap.
C. Compute prefix function for the pattern: `"ababaca"`
D. Explain 0/1 knapsack problem using dynamic programming
E. What is Complexity? Explain in detail asymptotic notations.

Q2)
A. Create a B tree of order 5 by inserting the following elements: `3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19`
B. Find out the time complexity for the recurrence equation as follows:

- a) `T(n) = T(n/2) + 1`
- b) `T(n) = 2T(n/2) + n`

Q3)
A. Write short note on master theorem.
B. Explain greedy strategy of designing algorithm.

Q4)
A. Analyze Time complexity of Binary Search using Divide and Conquer. Also write the algorithm for the same.
B. Explain Matrix chain multiplication in detail.

Q5)
A. Describe algorithm and complexity of all pair shortest path.
B. What is the sequence of job, for following sequence of job gives the snapshot of execution, which will achieve maximum profit.

Job	1	2	3	4	5	6
Profit	20	15	10	7	5	3
Deadline	3	1	1	3	1	3

Q6)
A. Explain the Knuth-Morris-Pratt algorithm (KMP).
B. Explain Genetic algorithms in detail.

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Q1)
A. What is Complexity? Explain in detail asymptotic notations.
B. Explain approximation algorithms with an example.
C. Compare Greedy approach and Dynamic Programming approach for an algorithm design.
D. Describe naive string matching method. Write the algorithm for the same.
E. Build a max heap for the following: `45, 65, 34, 25, 78, 56, 15`

Q2)
A. Define B-tree. Explain insertion and deletion operations on a B tree, with an example of each.
B. Differentiate between Prims and Kruskals algorithms.

Q3)
A. Find the longest common subsequence for the following two strings, using dynamic programming:
`X = "abcabcba"`, `Y = "babcbcab"`
B. Which are the different methods of solving recurrences. Explain with examples.

Q4)
A. Consider the instance of knapsack problem where `n = 6`, `M = 15`, profits are `(P1,P2,P3,P4,P5,P6) = (1,2,4,4,7,2)` and weights are `(W1,W2,W3,W4,W5,W6) =`

`(10,5,4,2,7,3)` . Find maximum profit using Fractional knapsack.
B. Explain matrix chain multiplication in detail.

Q5)
A. Sort the following numbers using Quicksort algorithm: `20, 30, 14, 56, 9, 72, 45, 5`
B. Describe, with the help of an example, KMP algorithm. Also, comment on complexity.

Q6)
A. Explain genetic algorithms in detail.
B. Write a note on optimal binary search tree.

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Q1)
A. Write note on masters Theorem.
B. Explain in details Red-Black tree.
C. Write note on optimal merge pattern.
D. Define & explain principal of optimality.
E. Explain in detail Naïve string-matching Algorithm.

Q2)
A. What is complexity? Explain in detail asymptotic notation.
B. Define B+ tree and explain in detail the insertion operation for the following sequence `51,52,53,54,55,56,57,58,59,60` and construct the B+ tree of order three.

Q3)
A. Write a recursive algorithm for quick sort & compute its complexity.
B. Given the program lengths `L = {12, 34, 56, 73, 24, 11, 34, 56, 78, 91, 34, 91, 45}` . Store them on three taps and minimize MRT.

Q4)
A. What is the divide and conquer strategy? Write an algorithm for finding the

maximum and minimum.
B. Explain the 0/1 knapsack algorithm in detail.

Q5)
A. Explain in detail Rabin Karp string matching Algorithm.
B. Explain in detail Travelling sale person problem with its complexity.

Q6)
A. Explain in detail Longest Common Subsequence (LCS) string matching algorithm with example.
B. Explain in details P, NP, NP hard and NP complete problem.