

Tribhuvan University
Institute of Science and Technology
2082
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Bachelor Level / Third Year/ Fifth Semester/ Science
Computer Science and Information Technology (CSC325)
(Design and Analysis of Algorithms)
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable.
The questions are of equal marks.

Section A

Attempt any TWO questions.

(2 × 10 = 20)

1. How do you define optimal solution? Does greedy algorithm always guarantee optimal solution? Given the string "SUPER DUPER CSIT", use a Greedy algorithm to build a Huffman tree. [1 + 2 + 7]
2. What is order statistics? Write and analyze the algorithm for randomized quick sort. [3 + 7]
3. Distinguish between dynamic programming and memorization. Parenthesize the matrices $A(30 \times 1)$, $B(1 \times 40)$, $C(40 \times 10)$ and $A(10 \times 15)$, for computing matrix multiplication using dynamic programming. [1 + 9]

Section B

Attempt any EIGHT questions

(8 × 5 = 40)

4. Solve the recurrence relation $T(n) = 2T(n/2) + n$ using recursion tree method. [5]
5. Find the best and worst case for Bubble sort. [5]
6. Using Extended Euclidean Algorithm, find the GCD of 12 and 16. [5]
7. Find all possible subsets of the integers that sum to 21 in the array {5, 6, 10, 11, 15} using back tracking technique. [5]
8. Define class P and NP problem. Why do we need approximation algorithms? Justify. [2 + 3]
9. State the time and space complexity for sequential search. Write the rules for master theorem for finding asymptotic bounds. [1 + 4]
10. Justify the worst case for binary search. Find the edit distance from the string "RELEVANT" to "ELEPHANT" using dynamic programming approach. [1 + 4]
11. Distinguish between recursion and backtracking. Using Miller-Rabin primality test, check whether 53 is prime or not? [1 + 4]
12. How does 0/1 Knapsack problem differ with fractional one? Find the minimum vertex cover in the following graph. [1 + 4]

