Tribhuvan University
Institute of Science and Technology
2076

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Bachelor Level / Third Year/ Fifth Semester/ Science
Computer Science and Information Technology (CSc.314)
(Design and Analysis of Algorithms)

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

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

Section A

Long Answer Questions
Attempt any two questions **(2x10=20)**

1. What do you mean by complexity of an algorithm? Explain about the asymptotic notations used to describe the time/space complexity of any algorithm with their geometrical interpretation and example. (1+9)

2. Explain about the divide and conquer paradigm for algorithm design with suitable example. Write the Quick sort algorithm using randomized approch and explain its time complexity. (4+6)

3. Explain in brief about the Backtracking approach for algorithm design. How it differs with recursion? Explain the N-Queen Problem and its algorithm using backtracking and analyze its time complexity (2+2+6)

Section B

Short Answer Questions
Attempt any eight questions **(8x5=40)**

4. Write the algorithm for Selection Sort and explain its time and space complexity. (5)

5. Solve the following recurrence relations using master method. (2.5+2.5)
   a. $T(n) = 7T(n/2) + n^2$
   b. $T(n) = 4T(n/4) + kn$

6. Explain the greedy algorithm for fractional knapsack problem with its time complexity. (5)

7. Trace the heap-sort algorithm for the following data: {12, 45, 62, 50, 85, 15, 28}. (5)

8. What do you mean by Dynamic Programming Strategy? Explain the elements of DP. (2+3)

9. Explain the approximation algorithm for solving vertex cover with suitable example. (5)

10. Explain the Prim's algorithm for MST problem and analyze its time complexity. (5)

11. Explain in brief about the classes P, NP and NP Complete with example. (5)

12. Write short notes on (2x2.5)
    a. Backtracking Strategy
    b. Tractable and Intractable problems