Bachelor Level / fifth-semester / Science   Full marks: 60
Computer Science and Information Technology(CSC314)   Pass marks: 24
(Design and Analysis of Algorithms)   Time: 3 hours
Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full 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 divide and conquer paradigm for algorithm design with suitable example. Write the Quick sort algorithm using randomized approach 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, NP complete with example.   **(5)**

12. Write short notes on: **(2x2.5)**

   a. Backtracking Strategy

   b. Tractable and Intractable problems