

**Tribhuvan University**  
**Institute of Science and Technology**  
**2076**

Bachelor Level / fifth-semester / Science Full marks: 80 **Computer Science and Information Technology(CSC314)** Pass marks: 32  
(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.

**Attempt all questions.**

- 1. What do you mean by time and space complexity? Explain Big Oh, Big Omega and Big Theta.**
- 2. Define recurrence relation. Explain the recursion tree method for solving the recurrence relation with an example.**
- 3. Explain the algorithm for binary search with an example and also discuss its time complexity.**
- 4. Compare the algorithms for quicksort, merge sort and heap sort in terms of the time and space complexity.**
- 5. Discuss how the knapsack problem can be solved in a greedy approach. Explain the algorithm and complexity.**
- 6. Describe prim's algorithm for finding the minimum spanning tree of a graph. Also trace the algorithm for a weighted connected graph.**
- 7. Trace the algorithm for matrix chain multiplication for the given chain ABCD with size array {5, 2, 3, 5, 4}.**
- 8. Define the convex hull in 2D. Write the Graham's scan algorithm and discuss its correctness and analyze its time complexity.**
- 9. Define the term left turn and right turn. Explain how you can detect the intersection of two given line segments efficiently.**
- 10. What is the application of approximate algorithms? Write the algorithm for approximating the vertex cover of a connected graph with an example.**

