

# POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2019  
Programme: BE Full Marks: 100  
Course: Analysis and Design of Algorithm Pass Marks: 45  
Time : 3hrs.

*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 the questions.**

1. a) What do you mean by performance analysis of algorithms? Explain space and time complexity of an algorithm using an example. 7  
b) Design an algorithm to find all the common elements in two sorted lists of numbers. For example, for the lists 2, 5, 5, 5 and 2, 2, 3, 5, 5, 7, the output should be 2, 5, 5. What is the maximum number of comparisons your algorithm makes if the lengths of the two given lists are m and n, respectively? 8
2. a) Briefly explain a Queue data structure. Write algorithm to add and remove an element from the circular queue and compute the complexity of your algorithm. 8  
b) Define Binary trees. Write algorithm to insert and delete a node in the binary tree. 7
3. a) Compare divide and conquer, greedy method and dynamic programming as general method of problem solving, in terms of completeness and optimality. 8  
b) Explain how you use divide and conquer approach to solve Strassen's Matrix Multiplication. 7
4. a) Explain how greedy approach is useful to find the solution to fractional knapsack problem. 8  
b) Explain the "Principle of Optimality" in dynamic programming with suitable example. 7
5. a) Apply Dynamic programming to multiply the following chain of matrices: M1, M2, M3 and M4 with respective, dimensions (5 x 10), (10 x 3), (3 x 7), (7 x 15)? 8  
b) Explain BFS and DFS as Graph Traversal Techniques with examples and analyze their performance in terms of time, space, completeness and optimality. 7
6. a) What do you mean by approximation algorithm? Write the algorithm for approximate the vertex cover of a connected graph with example. 8

- b) What is Backtracking method of problem solving? Explain how you solve 8-queen problem using backtracking method. 7
7. Write short notes on: (Any two) 2×5  
a) Tree vertex splitting problem  
b) TSP  
c) Hamiltonian Cycle