

POKHARA UNIVERSITY

Level: Bachelor
Semester: Fall
Programme: BE
Course: Analysis and Design of Algorithm

Year : 2020
Full Marks: 100
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 is algorithm analysis? Why it is necessary to analyze the algorithm? Explain big O, big θ and big Ω notation for performance analysis of algorithm. 8
b) Explain the master method for solving the recurrence relations. Solve the following recurrence relations using this method. 7
 - i.) $T(n) = 3T(n/2) + n$
 - ii.) $T(n) = 2T(n/4) + \sqrt{n}$
2. a) Briefly explain a stack data structure. Write algorithm to add and remove an element from the stack and compute the complexity of your algorithm. 8
b) Explain a min Heap. Write an algorithm to delete an element from a min Heap and find its time complexity. 7
3. a) Write the Iterative algorithm and Divide and conquer algorithm for MAX and MIN finding problem and explain which algorithm is efficient and why? 7
b) What is randomized quick sort? In which case randomized quick sort is appropriate? Sort the following sequence of numbers using Quick sort: 15, 10, 13, 9, 12, and 17. Find the worst case complexity of quick sort. 8
4. a) What is the basic different between Divide and conquer, Greedy method, Dynamic programming and Backtracking approach of problem solving? Explain with example. 7
b) Explain the "Principle of Optimality" in dynamic programming. Write the algorithm and define how multistage graph problem can be solved using dynamic programming. 8

5. a) Compare knapsack problem and 0/1 knapsack problem. Explain how 0/1 knapsack problem can be solved using dynamic programming. Compare the solution approach, with problem solved using greedy approach. 7
- b) Explain how can you implement breadth first search using queue? Write the algorithm for BFS and analyze its time and space complexity. 8
6. a) Define articulation point and bi-connected component of the graph? Write the algorithm for finding articulation point in the graph with suitable example. 8
- b) What is backtracking technique in problem solving? Explain how can you solved 8-queens problem using backtracking? 7
7. Write short notes on: (Any two) 2×5
- a) Job sequencing with deadline
 - b) TSP
 - c) Graph colouring problem