Nepal College of Information Technology
Balkumari, Lalitpur
## Analysis and Design of Algorithm

1. What is the need for algorithm analysis? How would you perceive the best, worst and average case complexities? Give an example, along with a suitable graph. (8)

2. Explain the master's method for solving the recurrence relations. Solve the following recurrence relations using the master's method. (8)
   a. $T(n) = 2T(n/4) + \sqrt{n}$
   b. $T(n) = 3T(n/2) + n$
   c. $T(n) = 4T(n/3) + n^2$

3. Explain Binary search tree. Write an algorithm to delete an element from BST and find its time complexity. (8)

4. Briefly explain a Queue and Priority Queue. Write algorithm to add and remove an element from the circular queue and compute the complexity of your algorithm. (8)

5. Write an algorithm for quick-sort and trace out the algorithm for the given array A [] = {-4, 1, 25, 50, 8, 10, 23}. (8)

6. What is the difference between fractional knapsack and 0/1 knapsack. Consider the following 7 items and the knapsack has capacity of 15. Find an optimal solution using fractional knapsack. (8)

Object(O)	1	2	3	4	5	6	7
Profits(P)	10	5	15	7	6	18	3
Weights(w)	2	3	5	7	1	4	1

7. Consider the set of given jobs as shown. Find a sequence of jobs, which will give maximum profit. (8)

Jobs	J1	J2	J3	J4	J5	J6
Deadlines	5	3	3	2	4	2
Profits	200	180	190	300	120	100

8. Find the edit distance in converting ROS to HORSE. (8)

9. What is the real-life application of tree vertex splitting problem? For δ = 5, add a booster to the following tree. (8)
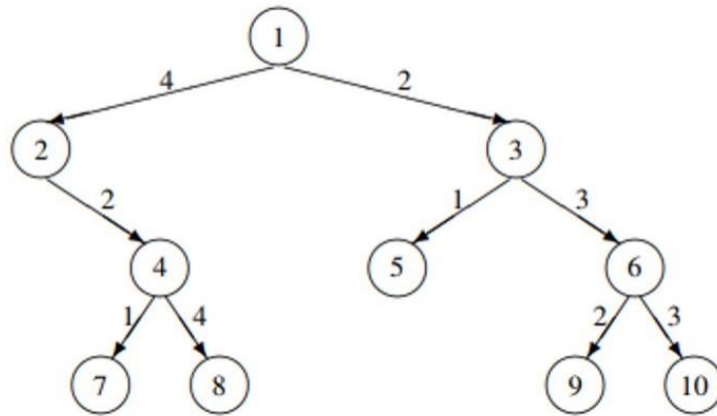
10. What is the optimal binary search tree? Using dynamic approach, build optimal binary tree for the given values. (8)

Keys	10	20	30	40
Frequency	4	2	6	3

11. What is the backtracking method for problem solving? Explain how you solve the 8-queen problem using the backtracking method. (8)
12. Write short notes on (Any two) (2*6)
    a. Multistage Graph
    b. Strassen's Matrix Multiplication
    c. Optimal Binary Tree.