Duration : 3 Hours **Marks : 80**

Note : Q1 is compulsory.
Attempt any THREE out of the remaining questions.
Assume suitable data wherever necessary.

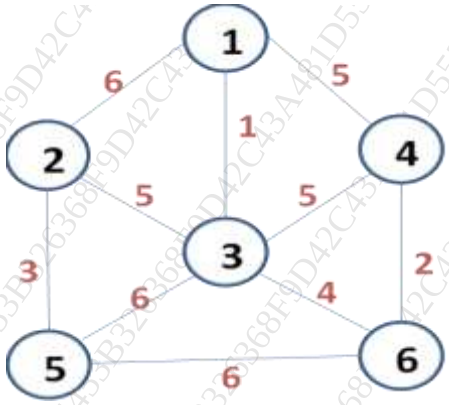
Q1. a) Write a note on Master's theorem. **05**
b) Explain Big Oh-O asymptotic notation. **05**
c) Explain Travelling Salesperson Problem and State its time complexity. **05**
d) Describe Container Loading Problem. **05**

Q2. a) Describe Strassen's matrix multiplication. **10**
b) What is an AVL Tree? Illustrate the insertion operation in an AVL tree by inserting following data values. **9, 11, 20, 4, 1, 6, 15, 8, 7, 5.** **10**

Q3. a) Explain Huffman Tree Algorithm with suitable example. **10**
b) Explain Quick sort algorithm using divide and Conquer and also derive its time complexity. **10**

Q4. a) Find an optimal solution for the following fractional Knapsack problem using Greedy algorithm. **Given: n = 5, W = 100.** **10**
Profit (Pi) = {20, 30, 66, 40, 60} , Weight (Wi) = {10, 20, 30, 40, 50}.
b) What is a Red Black tree? State the properties of a Red Black tree. **10**

Q5. a) What is minimum cost spanning tree? Draw the minimum cost spanning Tree for the following graph using Prim's algorithm. Show all intermediate Steps. Also find its cost. **10**



b) Explain Matrix Chain Multiplication problem using dynamic programming. **10**

Q6. a) Write a note on NP-Hard and NP-Complete Problems. **10**
b) Explain Rabin Karp algorithm with suitable example. **10**
