DEPARTMENT OF INFORMATION TECHNOLOGY
UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY
PANJAB UNIVERSITY, CHANDIGARH

Class: B.E. (I.T.), 5TH sem | Int. Exam-I (Nov,2020) | Section A

Time: 90mins | **SUB: Design and Analysis of Algorithms** | **Max. Marks: 30**

Note: All questions are compulsory. Each question carries equal marks (5X2=10).

1. a) Use recursive tree method to determine an asymptotic bound for the following recurrence:

   $T(n) = 3T(n/2) + n^3$

   b) Compute the tight asymptotic bounds for the following recurrence using the master method:

   $T(n) = 9T(n/3) + n^2$

2. a) Apply quick sort and explain the sorting steps for the following sequence:

   55, 44, 33, 66, 22, 11, 77

   b) Compute the following matrix product using Strassen's algorithm.

$$\begin{vmatrix} 5 & 2 \\ 3 & 7 \end{vmatrix} \begin{vmatrix} 2 & 6 \\ 4 & 1 \end{vmatrix}$$

3. a) Find an optimal solution for the following knapsack instance:

   (n=6, m=20)

P_i	W_i
13	6
4	2
17	7
6	4
8	1
20	5

   b) Determine a minimum cost spanning tree for the following graph using Kruskal's algorithm.