

M.Tech. Computer Science & Engineering (CBCS Pattern) Semester-II
PCSS21 - Advanced in Algorithms

P. Pages : 2

Time : Three Hours



GUG/W/24/10992

Max. Marks : 70

- Notes :
1. Solve **any five** questions.
 2. All questions carry equal marks.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Assume suitable data wherever necessary.

1. a) Solve the following recurrence relation using master method. Also find the values of constants. 8

$$T(n) = T(n/4) + \sqrt{n} + 4 \text{ for } n \geq 4 \text{ and } T(1) = 4.$$

- b) Solve the recurrence $T(n) = 2T(n/2) + n$ by substitution method. 6

2. Determine the cost & draw a structure of an optimal Binary search Tree for a set of $n = 5$ keys with the following probability. 14

i	0	1	2	3	4	5
p_i	0	0.15	0.10	0.05	0.10	0.20
q_i	0.05	0.10	0.05	0.05	0.05	0.10

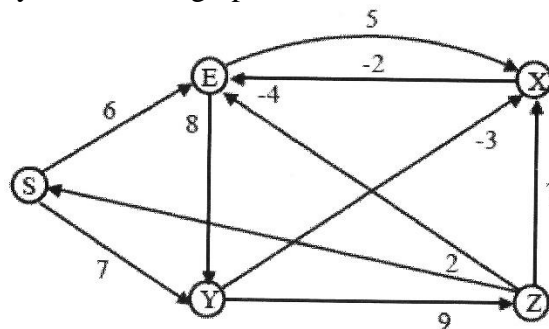
Also write an algorithm for OBST.

3. a) What is Extended - Euclid algorithm? Explain in detail. 7

- b) Use Strassen's algorithm's to the matrix product. 7

$$\begin{bmatrix} 4 & 5 \\ 3 & 6 \end{bmatrix} \begin{bmatrix} 3 & 5 \\ 8 & 2 \end{bmatrix}$$

4. Write algorithm initialize, relax and Bellman-ford. Find single source shortest path from any source node to every node in the graph. 14



5. Write and explain for Huffman code for following set of frequencies. 14

a: 35, b: 23, c: 10, d: 26, e: 9, f: 3.

Also write algorithm for Huffman code.

6. a) Explain two types of Randomize algorithm and compare them in brief. 7
- b) Write on RSA algorithm and give the solution. if $p = 11$, $q = 29$, $n = 319$ & $e = 3$, find the value of d ? What is the encryption of the message $M = 1000$. 7
7. a) Write an algorithm to solve 8-queens problem. Explain the explicit and implicit constraints associated with this problem. Give at least two solutions for this problem. 7
- b) How polynomial reduction can be used for showing NP-completeness of a problem? Explain in details. 7
8. Write recursive algorithm of Merge sort. Find complexity of merge sort by recurrence tree method. 14
