B.E. Computer Technology / Computer Science & Engineering Fifth Semester

CT502 / CSE503 - Design and Analysis of Algorithms

P. Pages : 3 **GUG/W/18/1663**

Time : Three Hours * 1 3 0 7 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Solve by using master's theorem, **9**

i) $T(n) = 7T(n/2) + n^2$

ii) $T(n) = 2T(n/2) + \sqrt{n}$

iii) $T(n) = 4T(n/2) + \log_n$

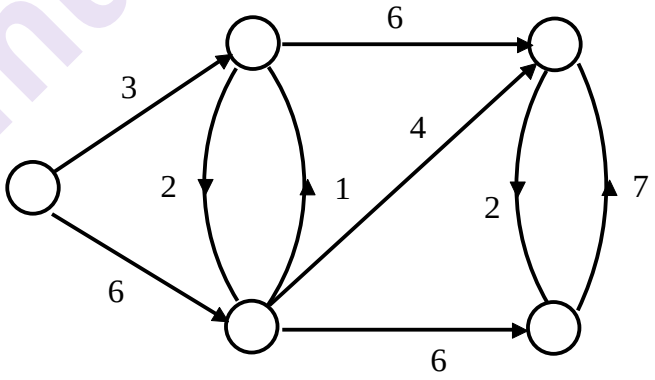
b) Explain Recursion Tree method for solving following recurrence equation **7**
$T(n) = 3.T(n/3) + n^2$.

OR

2. a) Explain following methods of Amortized analysis. **8**
i) Aggregate method
ii) Accounting method

b) Write a brief note on asymptotic notations. **8**

3. a) Explain single source shortest path Dijkstra's greedy algorithm using given graph. **8**



b) Find the optimal solution for following fractional Kanpsack problem. **8**
n = 7, m = 15.

P_i	10	5	15	7	6	18	3
W_i	2	3	5	7	1	4	1

OR

4. a) Find optimal prefix Huffman code for the given set of frequencies. **8**
a:35, b:23, C:10, d:26, e:9, f:3

b) Find maximum profit value of n = 5 jobs. **8**

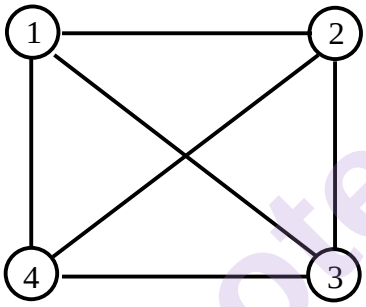
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

5. a) Show that an optimal parenthesization of a matrix chain product is for the given dimensions. **10**
$((A_1(A_2\ A_3))\ ((A_4A_5)A_6))$
$P = \langle 30, 35, 15, 5, 10, 20, 25 \rangle$

b) Write algorithm and complexity of Floyd's Warshalls algorithm. **6**

OR

6. a) Solve travelling sales person problem using dynamic programming solution. **8**



	1	2	3	4
1	0	10	15	20
2	5	0	9	10
3	6	13	0	12
4	8	8	9	0

b) Write algorithm for optimal binary search tree using dynamic programming approach. **8**
Also draw tree for the following root matrix.

	1	2	3	4	5	6
1	1	2	3	3	6	
	2	2	3	3	3	
		3	4	4	5	
			4	5	5	
				5	5	
					6	

Fig. root matrix

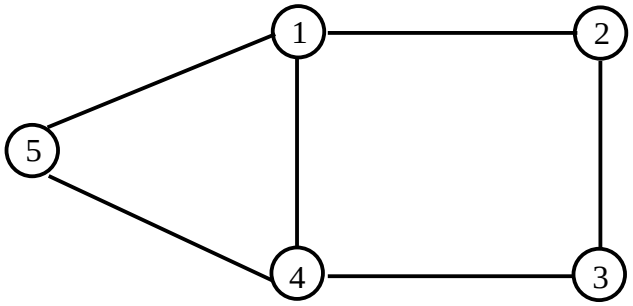
7. a) Explain N-Queen's problem using backtracking. **8**

b) Write a algorithm and explain for Graph coloring using backtracking approach. **8**

OR

8. a) Write a note on open addressing. **8**

b) Write algorithm and find Hamiltonian cycles in the given graph. **8**



9. a) Write a program to implement non-deterministic search algorithms. **8**

b) Write non-deterministic knapsack algorithm and explain. **8**

OR

10. a) Give relationship between np-hard and np-complete problems. **8**

b) Show that the clique problem is np-hard using 3-SAT problem by reduction (note : consider any CNF function with 3-clauses) **8**

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