B.E.(with Credits)-Regular-Semester 2012-Information Technology Sem V

IT505 - Design and Analysis of Algorithms

P. Pages : 3 **GUG/W/16/3774**

Time : Three Hours * 3 9 7 4 * Max. Marks : 80

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

1. a) Solve the recurrence relation **8**

$x(n) = 6x_{n-1} - 9x_{n-2}$ for $x_0 = 2,\ x_1 = 3$

b) Show that the following equalities are correct - **8**

i) $n^3 + 10n^2 = \theta(n^3)$

ii) $2n^2 2^n + n \log n = \theta\ (n^2 2^n)$

OR

2. a) Write down properties of asymptotic notations. **8**

b) Find the time complexity of : **4**

i)
```
defi b (n)
{
    if n = = 0 or n = = 1
    return 1 ;
    else
    return defi b (n-1) + defi b (n-2) ;
```

ii) What are the different types of time complexity ? **4**

3. a) Explain divide and conquer methods with merge sort algorithm. Give an example. **8**

b) Find an optimal solution to the Knapsack problem n = 6, M = 50 **8**

$(W_1, W_2, W_3, W_4, W_5, W_6) = (10, 30, 20, 15, 12, 25)$

$(P_1, P_2, P_3, P_4, P_5, P_6) = (40, 30, 50, 60, 70, 80)$

OR

4. a) Find minimum waiting time using job scheduling using without deadline. **8**

$(j_1, j_2, j_3, j_4, j_5, j_6, j_7) = (25, 12, 13, 20, 22, 17, 30)$

b) Find optimal solution for maximum profit using job scheduling with deadline. **8**

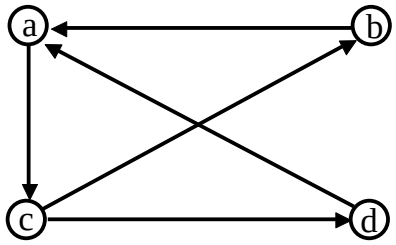
I :	j_1	j_2	j_3	j_4	j_5	j_6
G_i :	28	20	15	10	8	5
P_i :	3	4	1	2	1	3

5. a) Solve all pair shortest path problem for the diagraph. **8**

$b \to a = 2,\ a \to c = 3$

$c \to d = 1,\ c \to b = 7,$

$a \to a = 6$

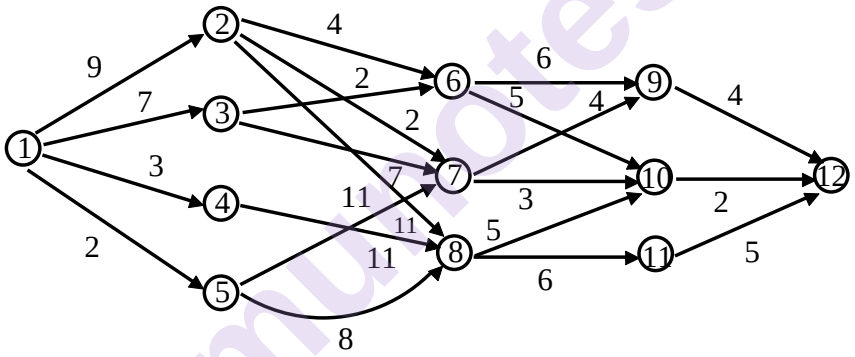


b) For the following key n = 6, construct the OBST : **8**

I	0	1	2	3	4	5	6
P_i		.12	.06	.10	.06	.10	.10
Q_i	.08	.10	.04	.05	.09	.06	.04

OR

6. a) Using dynamic approach solve the following graph using multi-stage graph. **8**



b) Find the optimal solution to 01, knapsack problem for the instances n = 3, m = 8. **8**

$(P_1, P_2, P_3) = (11, 21, 31)$ &

$(W_1, W_2, W_3) = (2, 5, 3)$

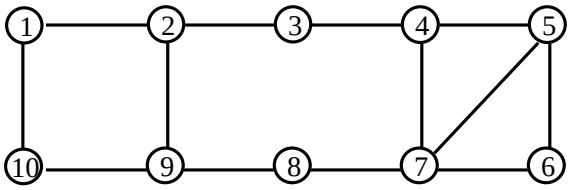
7. a) Trace the N Queen problem for N = 8. **8**

b) Apply backtracking technique to solve the following instance of the subset sum problem S = (1, 3, 4, 5) and d = 11. **8**

OR

8. a) Describe the graph coloring algorithm and explain with example. **8**

b) Apply backtracking to the Hamiltonian cycle. **8**



9. a) Explain in detail NP hard and NP completeness problem. **8**

b) Write in detail deterministic and non-deterministic problems. **8**

OR

10. Write short note on : **16**

i) P = NP or $P \subseteq NP$

ii) NP theory & its categories

iii) NP hard & NP completeness

iv) Decision problems

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