B.E.(Information Technology) Semester Fifth (C.B.S.)
Design and Analysis of Algorithms

P. Pages : 3

Time : Three Hours

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0675

KNT/KW/16/7355

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Solve the following using change of variable method ? **7**
$T(n) = 6T(n/16) + \lfloor n + 4 \ T(1) = 4$

   b) What are algorithm design strategy explain in detail ? **6**

OR

2. a) Explain master method for solution of recurrence relation and solve following ? **7**
   1) $T(n) = 4T\left(\frac{6n}{18}\right) + \log n$

   2) $T(n) = 9T(n/27) + n^2 + 3$.

   b) Solve following recurrence. **6**
$T(n) = \begin{cases} 1 & \text{if } n = 0 \\ 2T(n-1) + 6 & \text{Otherwise} \end{cases}$

3. a) Explain the methods of Amortized analysis along with 8-bit binary increment operation? **7**

   b) What is sorting network ? Explain half cleaner and apply half cleaner on following sequence. **7**
0 1 0 0   1 0 0 0.

OR

4. a) What are Asymptotic notations ? Calculate Asymptotic upper, lower & tight bound for following ? **8**
   1) 300n+4

   2) $11n^2 + 3n + 2$

   3) $5^{9n} + 6$

   b) Write an algorithm for insertion sort ? **6**

5. a) Find the solution of partial (fractional) Knapsack? **6**
n = 5 capacity = 11
W = (1, 2, 5, 8, 7)
P = (1, 6, 18, 25, 30)

b) Multiply following matrix using stresson's matrix multiplication. **7**

$$\begin{bmatrix} 1 & 2 \\ 5 & 8 \end{bmatrix} \begin{bmatrix} 6 & 3 \\ 9 & 5 \end{bmatrix}$$

OR

6. a) Write an algorithm for min-max and solve following. **7**
10, -9, 20, 38, 40, 22, 35, 47.

b) Differentiate between following greedy and divide and conquer. **4**

c) Explain the characteristics of Greedy strategy? **2**

7. a) What is LCS ? Write an algorithm to print LCS and calcule LCS for following sequence ? **7**
X = FRUNANETO
Y = CHRANATEO

b) Calculate the no. of scaler multiplication and parenthesization for following matrices. **7**
$A_1 = 12 \times 6$
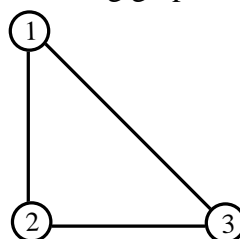$A_2 = 6 \times 20$
$A_3 = 20 \times 15$
$A_4 = 15 \times 17$

OR

8. a) Solve the following using Floyd-Warshall method. **8**
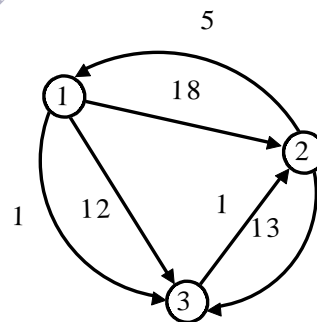
b) Write an algorithm for OBST? **6**

9. a) What is graph coloring ? Color the following graph using graph coloring algorithm. **7**

b) Write an algorithm for DFS. **6**

OR

10. a) Write an algorithm to calculate Hamaltonian cycle. **7**

b) What is backtracking ? How it is useful to solve the problem. **3**

c) What is Articulation point Explain the steps to calculate articulation point ? **3**

11. Write an algorithm for following. **13**

1) Clique.

2) Graph partition into Triangle.

3) Independent set problem.

OR

12. a) Explain non deterministic searching & sorting ? **7**

b) Explain following terms. **6**

1) NP.

2) NP-Hard.

3) Decision & Optimization problem.

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