

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

P. Pages : 2

Time : Three Hours



**GUG/W/23/10992**

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. 8  
$$T(n) = T(n/4) + \sqrt{n+4}$$

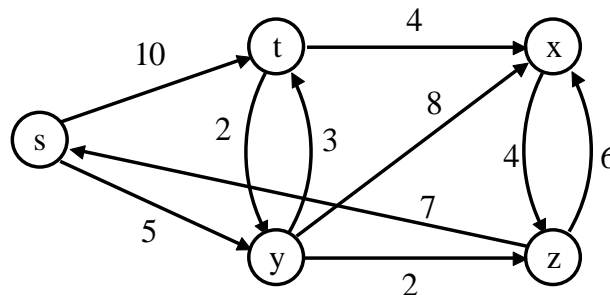
for  $n \geq 4$  and  
 $T(1) = 4$

b) What are different Asymptotic notation? Explain them briefly for the following equations, 6  
find the values of constants using various approaches.  
i)  $3n + 2$   
ii)  $10n^2 + 4n + 2$

2. a) Find the LCS of the following sequence. 7  
 $x = a, a, b, a, a, b, a, b, a, a$   
 $y = b, a, b, a, a, b, a, b$

b) Compute gcd (99,78) with extended – Euclid algorithm. 7

3. a) Solve the following problem using Dijkstra's algorithm. 8



- b) Explain the following terms related to maximum flow network. 6  
i) Flow network.  
ii) Residual network  
iii) Augmenting path
4. a) Write recursive FFT algorithm. 8
- b) Among merge sort, insertion sort and Bubble sort which sorting techniques is the best in the worst case. Support your argument with example and analysis. 6

5. a) What is minimum cost spanning tree? Write an algorithm for any one method for finding the minimum cost spanning tree. Also discuss its complexity. **8**
- b) Consider inserting the keys 26, 37, 60, 76, 66, 86 into a hash-table of size  $m = 11$  using. **6**
- i) Linear probing and
- ii) Quadratic probing with  $c_1 = 1$  and  $c_2 = 3$ .
- Consider the primary hash function is  $h'(k) = K \bmod m$
6. a) What is information retrieval? Explain various technique of information retrieval. **7**
- b) Explain Topological sort procedure for Directed Acyclic Graph (DAG) **7**
7. a) Explain Dynamic Paradigm. Solve an optimal parenthesization of matrix chain product whose sequence of dimension is  $\langle 30, 35, 15, 5, 10, 20, 25 \rangle$  Write algorithm also to explain the same. **10**
- b) Compare greedy algorithm with dynamic algorithm. **4**
8. a) How polynomial reduction can be used for showing NP-completeness of a problem? Explain in detail. **10**
- b) Explain the following terms. **4**
- i) Decision problem vs optimization problem.
- ii) NP-Completeness

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