M.Tech. Computer Science & Engineering (CBCS Pattern) Sem-II

PCSS21 - Advanced In Algorithms

P. Pages : 2 **GUG/W/22/10992**

Time : Three Hours * 1 7 8 6 * Max. Marks : 70

Notes : 1. Attempt **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) What is Amortized Complexity? Explain the amortized complexity for 4 – bit binary numbers from 0 to 8. Write algorithm for binary incrementation operation. **7**

b) What are the different asymptotic notation? Explain them briefly. For the following equations, find the values of constant using various approaches. **7**

i) $3n + 2$ ii) $10n^2 + 4n + 2$

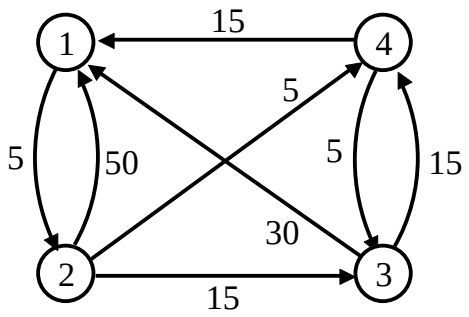
2. a) Find the LCS of the following sequence. **7**

$X = a, a, b, a, a, b, a, b, a, a$

$Y = b, a, b, a, a, b, a, b$

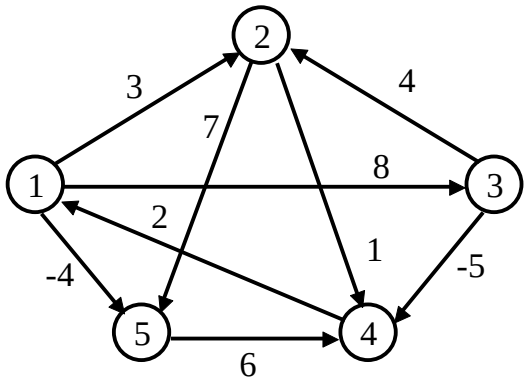
b) Compute gcd $(99, 78)$ with extended – Euclid algorithm. **7**

3. a) Write all pair shortest path algorithm. Implement the algorithm on following graph. **8**



b) Among Merge sort, Insertion sort and Bubble sort which sorting technique is the best in the worst case? Support y our argument with examples and analysis. **6**

4. a) Apply Floyd – Warshall algorithm for constructing shortest path. Show the matrices $D^{(k)}$ and $\pi^{(k)}$ computed by the Floyd Warshall algorithm for the graph. **8**



b) Explain the following terms related to maximum flow network. **6**
   i) Flow network
   ii) Residual network
   iii) Augmenting path.

5. a) Compute the DFT of the vector (0, 1, 2, 3) **7**

b) Explain the RSA public – key cryptosystem. **7**

6. a) Explain Naive – string matching algorithm. **8**

b) What is Information retrieval? Explain various technique of Information retrieval. **6**

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) Explain Chinese remainder theorem in detail. **7**

8 a) What is Vertex cover problem? Write the procedure for APPROX – VERTEX cover. **7**

b) Explain Reducibility. How polynomial reduction can be used to solve NP – Hard problem? **7**

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