CBCS Scheme

USN | | | | | | | | | | |

16SCS23

Second Semester M.Tech. Degree Examination, June/July 2017
Advanced Algorithms

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. What is amortized analysis? What are the common techniques used in amortized analysis? Explain any two techniques with an example. **(08 Marks)**

b. Write the Ford Fulkerson algorithm. And also find the maximum flow in the following graph of Fig. Q1 (b). **(08 Marks)**

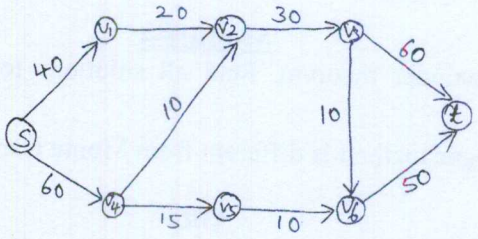

Fig.Q1 (b)

OR

2 a. Explain in detail, the basic asymptotic notations. **(08 Marks)**

b. Write and explain algorithm for recursive FFT, also determine its running time. **(08 Marks)**

Module-2

3 a. Let G =(V, E) be a bipartite graph with vertex partition V = LUR, and let G′ be its corresponding flow network. Give a good upper bound on the length of any augmenting path found in G′ during the execution of FORD FULKERSION. **(06 Marks)**

b. Write EXTENDED – EUCLID algorithm and compute the values (d, x, y). That call the EXTENDED EUCLID (14, 100) **(06 Marks)**

c. Draw the group operation tables for the group $(Z_4, +_4)$ and $(Z_5^*, \cdot 5)$. **(04 Marks)**

OR

4 a. Write Johnsons algorithm for sparse graph. Use same to find shortest paths between all pairs of vertices in the graph of Fig. Q4 (a). **(10 Marks)**

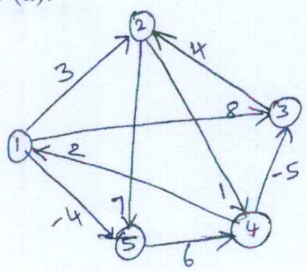

Fig. Q4 (a)

b. Use Master method to find solution to the following recurrences:

(i) $T(n) = 3T\left(\frac{n}{2}\right) + n^2$ (ii) $T(n) = uT\left(\frac{n}{2}\right) + n^2$ (iii) $T(n) = 2^n T\left(\frac{n}{2}\right) + n^n$. **(06 Marks)**

Module-3

5 a. What is a recurrence? Solve the recurrence using substitution method. **(05 Marks)**

$$T(n) = \begin{cases} 1, & \text{if } n = 1 \\ 2T\left(\frac{n}{2}\right) + n, & \text{if } n > 1 \end{cases}$$

b. Use recursion tree method to solve the recurrence $T(n) = 3T\left(\frac{n}{4}\right) + Cn^2$. **(05 Marks)**

c. Write the "Knuth-Morris-Pratt" algorithm for string matching. **(06 Marks)**

OR

6 a. Write and explain linear false biased Monte Carlo algorithm for primality testing. **(08 Marks)**

b. Write and explain algorithm to solve modular linear equation. Also find all solutions to the equation, $35x \equiv 10 (\text{mod } 50)$. **(08 Marks)**

Module-4

7 a. Write Chinese remainder theorem. Find all solutions to the equation $x \equiv 4 (\text{mod } 5)$ and $x \equiv 5 (\text{mod } 11)$. **(14 Marks)**

b. Explain how Lasvegas method is different from Monte Carlo method. **(02 Marks)**

OR

8 a. Construct the string matching automation for the pattern $P = aabab$ and illustrate its operation on the text string $T = aaababaabaababaab$. **(08 Marks)**

b. Explain randomizing deterministic algorithms taking linear search algorithm as an example. **(08 Marks)**

Module-5

9 a. With an algorithm, explain the working procedure of Robin-Karp for string matching. **(10 Marks)**

b. Write an algorithm for testing polynomial equality using Monte Carlo algorithm. **(06 Marks)**

OR

10 a. Explain Boyer-More string algorithm and determine its running time. **(08 Marks)**

b. Describe the encryption mechanism using public key crypto systems. Consider the RSA key set with p = 11, q = 29, n = 319 and e = 3. What value of d should be used in secret key? What is the encryption of the message 100? **(08 Marks)**

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