CBCS SCHEME

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

16/17SCS23

Second Semester M.Tech. Degree Examination, June/July 2019
Advanced Algorithms

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the various types of asymptotic notations with an example. **(08 Marks)**

b. What is recurrence? Solve the recurrence using substitution method.

$$T(n) = \begin{cases} 1, & \text{if } n = 1 \\ 2T(n/2) + n, & \text{if } n > 1 \end{cases}.$$ **(08 Marks)**

OR

2 a. Use recursion tree method to solve the recurrence $T(n) = 3T(n/4) + Cn^2$. **(06 Marks)**

b. State the Maser theorem and solve the following recurrence relations using Master theorem.
$T(n) = 3T(n/4) + n \lg n$. **(04 Marks)**

c. What is amortized analysis? What are the common techniques used in amortized analysis? Explain any two techniques with an example. **(06 Marks)**

Module-2

3 a. Using Bellman – Ford algorithm, find the shortest path from the source vertex '5' to the remaining vertices in the graph shown in the Fig.Q3(a). **(08 Marks)**

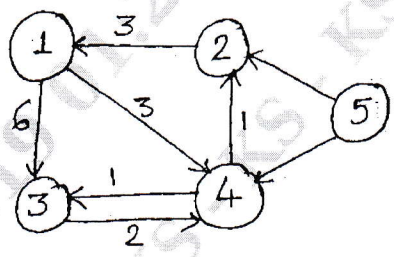

Fig.Q3(a)

b. Write the Johnson's algorithm to solve all - pair shortest path problem for sparse graphs with example. **(08 Marks)**

OR

4 a. Write and explain the algorithm for recursive FFT. Also determine its running time. **(08 Marks)**

b. Explain Ford–Fulkerson method for solving the maximum flow problem. **(08 Marks)**

Module-3

5 a. Write Extended_Euclid algorithm and compute the values (d, x, y) that call the Extended_Euclid(299, 221). **(08 Marks)**

b. Write and explain algorithm to solve modular linear equation. Also find all solutions to the equation : $35x \equiv 50 \pmod{55}$. **(08 Marks)**

OR

6 a. Use Chinese remainder theorem to find all solutions to the equation : $x \equiv 3 \pmod 5$ and $x \equiv 4 \pmod 7$. **(08 Marks)**

b. Consider an RSA key set with p = 11, q = 29, n = 319 and e = 3, what value of 'd' should be used in the secret key? What is the encryption of the message M = 100? **(08 Marks)**

Module-4

7 a. Write and explain the Rabin-Karp string matching algorithm. working modulo q = 11, how many spurious hits does the Rabin-Karp matcher encounter in the text :
T = 3 1 4 1 5 9 2 6 5 3 5 8 9 7 9 3 when looking for the pattern p = 26? **(08 Marks)**

b. Construct the string matching automation for the pattern p = a a b a b and illustrate its operation on the text string T = a a a b a b a a b a a b a b a a b. **(08 Marks)**

OR

8 a. Write the Knuth – Morris – Pratt algorithm for string matching. Compute the prefix function π for the pattern a b a b b a b b a b b a b a b b a b b. **(08 Marks)**

b. Write the Naïve string matching algorithm. Show the operation of the same, for the pattern in the text T = 0 0 0 0 1 0 0 0 1 0 1 0 0 0 1. **(08 Marks)**

Module-5

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

b. Write an algorithm for testing polynomial equality using Monte Carlo algorithm **(08 Marks)**

OR

10 a. Explain Monte Carlo and Las Vegas algorithms wit appropriate examples. **(08 Marks)**

b. Write a note on probabilistic numerical algorithms. **(08 Marks)**

* * * * *