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10SCS22

Second Semester M.Tech. Degree Examination, June 2012
Advanced Algorithms

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Define the asymptotic notations O, θ, Ω, o, ω. **(05 Marks)**

b. Show that the solution to $T(n) = 2T(\lfloor n/2 \rfloor) + n$ is $O(n \lg n)$. **(05 Marks)**

c. Use a recursion tree to determine a good asymptotic upper bound on the recursion $T(n) = 3T(n/4) + cn^2$. Use the substitution method to verify your answer. **(10 Marks)**

2 a. Write the Bellman – Ford algorithm and use it to find shortest path distance form source 's' and to all other vertices. **(08 Marks)**

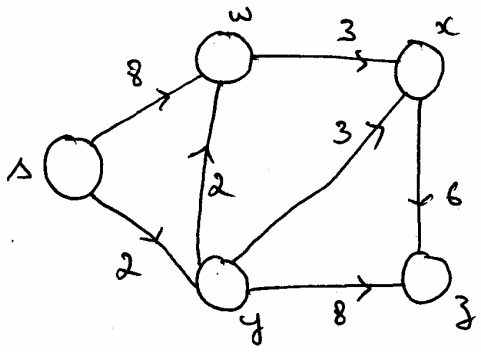

Fig. Q2(a)

b. Write and explain the basic Ford – Fulkeson algorithm. **(06 Marks)**

c. What is meant by 'relaxing' an edge? Give the pseudocode for RELAX(u, v, w) and explain. **(06 Marks)**

3 a. Illustrate the potential method of amortized analysis on stack operations. **(06 Marks)**

b. Give the outline of the procedure for multiplying two polynomials A(x) and B(x) of degree – bound n in θ(n lg n) time. **(04 Marks)**

c. Write and explain the algorithm for recursive FFT. Also determine its running time. **(10 Marks)**

4 a. Give the pseudocode for computing extended Ecludian. Find gcd(99, 78), using extended Ecludian and show the computation steps at each level of recursion. **(06 Marks)**

b. Discuss the Chainese remainder theorem. Find solution to the equation $a \equiv 2 \pmod 5$ and $a \equiv 3 \pmod{13}$. **(10 Marks)**

c. Define a group and give its properties. **(04 Marks)**

5 a. Describe the encryption mechanism using public key cryptosystems. **(08 Marks)**

b. Consider a 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 M = 100? **(07 Marks)**

c. Write an algorithm to find factors of small numbers using 'Pollard – Rho'. **(05 Marks)**

6 a. Give the naïve string – matching algorithm. Show how the algorithm works for the pattern P = aab and text T = acaabc. Why this algorithm is inefficient? **(07 Marks)**

b. Draw the state – transition diagram for the string matching automation that accepts all string sending in the string abababa. **(03 Marks)**

c. With an algorithm explain the working procedure of Rabin – Karp for string matching. **(10 Marks)**

7 a. Compute the prefix function π (Knuth–Morris and Pratt Algorithm) for the pattern abababa. **(05 Marks)**

b. Write and explain an algorithm for polynomial equality testing, using Monte Carlo method. **(10 Marks)**

c. Explain how Lag Vegas method is different from Monte Carlo method. **(05 Marks)**

8 Write short notes on :

a. Polynomial representation

b. Master method

c. Maximum bipartite matching

d. String matching autometa. **(20 Marks)**

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