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14SCN151

First Semester M.Tech. Degree Examination, Dec.2014/Jan.2015
Advanced Algorithms

Time: 3 hrs. Max. Marks:100

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

1 a. Explain the asymptotic notations. θ, O and Ω notations. **(06 Marks)**

b. Explain the master method for solving recurrences. For which case of the master theorem does the recurrences belong : i) $T(n) = 9T\left(\frac{n}{3}\right) + n$ ii) $T(n) = 3T\left(\frac{n}{4}\right) + n \log n$

iii) $T(n) = 2T\left(\frac{n}{2}\right) + n \log n$. **(08 Marks)**

c. Illustrate the aggregate method of amortized analysis on binary counter operation. **(06 Marks)**

2 a. Discuss the Bellman-Ford algorithm and find the shortest path for the graph shown in Fig. Q2 (a). Using vertex 'd' as source. **(10 Marks)**

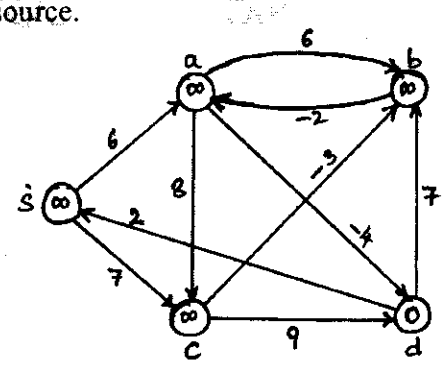

Fig. Q2 (a)

b. Applying Ford-Fulkerson algorithm, find maximum flow of given network G in Fig. Q2 (b) and explain the steps. **(10 Marks)**

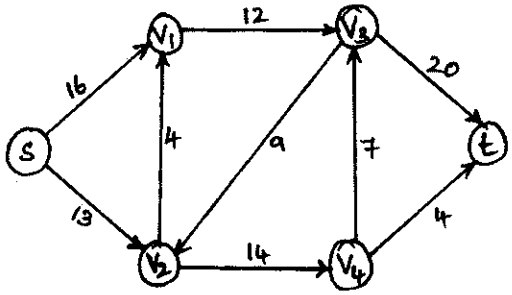

Fig. Q2 (b)

3 a. Write recursive Fast Fourier Transform (FFT) algorithm and determine its running time. **(10 Marks)**

b. Draw the butterfly diagram of 8-point parallel FFT circuit and describe the iterative FFT algorithm. **(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 and find the solution to the equation $x \equiv 4(\text{mod}\,5)$ and $x \equiv 5(\text{mod}\,11)$. **(10 Marks)**

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

5 a. Write the procedure for RSA cryptosystem. Consider a RSA key set with p = 17, q = 11, n = 187 and e = 7. What value should be used in the secret key? What is the encryption of the message M = 88. **(10 Marks)**

b. Explain modular linear equation solver algorithm. Using modular linear equation solver algorithm, find all solutions to the equation $35x \equiv 10(\text{mod}\,50)$. **(10 Marks)**

6 a. Explain string matching with finite automata. Write state-transition diagram and transition function δ, for the string-matching automation that accepts all strings ending in the string ababaca. **(10 Marks)**

b. Explain Boyer-Moore algorithm. Given the text: WHICH-FINALLY-HALTS--AT-THAT and pattern is AT-THAT, match using Boyer Moore algorithm. **(10 Marks)**

7 a. Explain randomizing deterministic algorithms taking linear search algorithm as example. **(10 Marks)**

b. Explain Monte-Carlo and Las-Vegas algorithm with appropriate example. **(10 Marks)**

8 Write short notes on the following:

a. Potential method.

b. Johnson algorithm for sparse graphs.

c. Knuth-Morris Pratt algorithm.

d. Probabilistic numeric algorithms. **(20 Marks)**

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