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**Second Semester M.Tech. Degree Examination, December 2011**  
**Advanced Algorithms**

Time: 3 hrs.

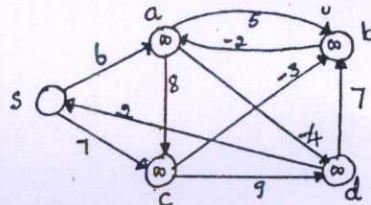
Max. Marks:100

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

- 1 a. Define  $\theta$ ,  $O$  and  $\Omega$  notations. (03 Marks)
- b. Using master method solve the following recurrences (07 Marks)
- i)  $T(n) = T\left(\frac{9n}{10}\right) + n$       ii)  $T(n) = 2T\left(\frac{n}{4}\right) + \sqrt{n}$ .
- c. Using recursion tree solve the following (10 Marks)
- i)  $T(n) = 2T\left(\frac{n}{2}\right) + n^2$       ii)  $T(n) = T(n - a) + T(a) + cn$  where  $a \geq 1$  and  $c > 0$ .

- 2 a. Discuss the Bellman - Ford algorithm and find the shortest path for the graph shown in Fig.Q.2(a). (10 Marks)

Fig.Q.2(a).



- b. Explain the Max-flow min-cut theorem of Ford Fulkerson method. (10 Marks)

- 3 a. Write recursive Fast Fourier transform (FFT) algorithm and determine its running time. (10 Marks)
- b. Write a note on : i) Discrete Fourier Transform (DFT) ; ii) Polynomial representations. (10 Marks)

- 4 a. Consider an 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. Discuss the Chinese remainder theorem. Find solutions to the equation  $a \equiv 2 \pmod{5}$  and  $a \equiv 3 \pmod{13}$ . (10 Marks)

- 5 a. Working modulo  $q = 11$ , how many spurious hits does the Rabin Karp matches encounter in the text  $T = 3141592653589793$  when looking for the pattern  $P = 26$ . (10 Marks)
- b. Compute the prefix function  $\pi$  for the pattern  $a b a b b a b b a b b a b b a b b$  when the alphabet  $\Sigma = \{a, b\}$ . (10 Marks)

- 6 a. Explain amortized analysis with suitable examples. (10 Marks)
- b. How Boyer - Moore algorithm works for string matching? Explain its worst case time complexity. (10 Marks)

- 7 a. Explain randomized deterministic algorithm and probabilistic numeric algorithm. (10 Marks)
- b. Explain Monte Carlo and Las Vegas algorithms. (10 Marks)

- 8 Write a note on :
- a. Residual networks ; b. Relaxation technique in DAG
- c. Extended Euclidean algorithm ; d. Johnsons algorithm. (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

ch1

ch2

ch3

ch4

ch4

ch5

ch16

ch5

ch7

ch2

ch2

ch4

ch2