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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester, M.Tech - Computer Science and Engineering (MCSE)

Semester End Examination; Jan/Feb. - 2016

Advanced Algorithms

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each **unit**.*

UNIT - I

1 a. List out the various asymptotic notation for classifying the growth function. Discuss them with respect to tight bound, upper bound and lower bound. 10

b. Obtain the order of complexity of the following recurrence relations, 10

(i) $T(n) \le 3T\left(\left\lfloor n/4 \right\rfloor\right) + cn^2$ (ii) $T(n) = T\left(n/3\right) + T\left(2n/3\right) + O(n)$

2 a. Define master's theorem. Using the same the obtain the order of complexity of following recurrences, 10

(i) $T(n) = 8T\left(n/2\right) + \theta\left(n^2\right)$ (ii) $T(n) = 2T\left(n/2\right) + n \log n$

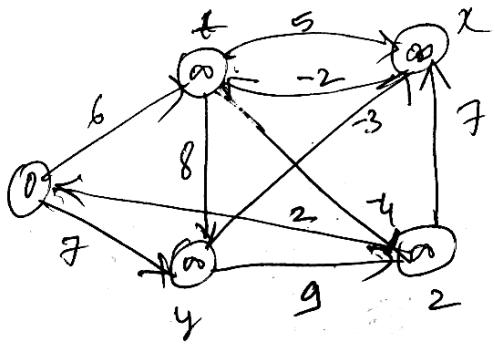
b. With an illustrative example, discuss how the substitution method can be used to solve recurrences. 10

UNIT - II

3 a. Which are the two key ingredients required for an optimization problem to be solved using dynamic programming. Briefly discuss their significance in the solution methodology. 12

b. Obtain the single source shortest path for the graph using Bellman-Ford algorithm.

Fig. Q 3(b)



8

4 a. With the help of an algorithm, discuss the working of Johnson algorithm for finding the pair shortest path. 10

b. List out the common techniques used in Amortized analysis. Explain any one in detail. 10

Contd…2

UNIT - III

5 a. What is the various performance measures used to study the efficiency of the multithread algorithm? Discuss the impact of using various schedulers on the efficiency. 10

b. With the help of an algorithm, discuss the working of Miller-Robin randomized primality test algorithm. 10

6 a. Discuss the steps involved in RSA crypto system. Prove the correctness of the same. 10

b. With the example of computing Fibonacci using recursion, discuss the adaption dynamic multithreading to achieve parallelism is given problem. 10

UNIT - IV

7 a. With the help of an algorithm discuss the working of Knuth-Morris-Pratt string matching algorithm. 10

b. Discuss how a Hamiltonian problem can be made NP-complete using verification approach. 10

8 a. Given the state transition table, constant a string matching automata and demonstrate it for the given input text T = abababacaba and the pattern p = ababaca

State	I/p		
	a	b	c
0	1	0	0
1	1	2	0
2	3	0	0
3	1	4	0
4	5	0	0
5	1	4	6
6	7	0	0
7	1	2	0

10

b. What is a dique problem? Prove that it is NP-complete. 10

UNIT - V

9 a. Discuss the working Monte-Carlo algorithm for primality testing. 10

b. List out the various parallel algorithm models. Discuss the PRAM model for computing matrix multiplication. 10

10 a. Write short notes on : 10

(i) Network model (ii) Performance of Parallel algorithm.

b. Write a note on : 10

(i) Randomizing Quicksort (ii) Las Vegas Algorithm.

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