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MCA

(SEM III) THEORY EXAMINATION 2017-18

DEGIN & ANALYSIS of ALGORITHMS

Time: 3Hours ***Max. Marks: 100***

Note: Attempt all Sections. Assume missing data, if any.

SECTION-A

Q1. **Attempt all parts of this question.** **10x2=20**

(a) Why Counting sort is called stable sort.
(b) Apply BUCKET SORT algorithm on the following array $0 \cdot 78, 0 \cdot 17, 0 \cdot 39, 0 \cdot 26, 0 \cdot 72, 0 \cdot 94, 0 \cdot 21, 0 \cdot 21, 0 \cdot 12, 0 \cdot 23, 0 \cdot 68$
(c) State the properties of Binomial Tress.
(d) Differentiate between asymptotic notation O and Ω.
(e) Define Hamiltonian cycle.
(f) Explain randomized algorithm with the help of an example.
(g) Differentiate between average analysis and amortized analysis.
(h) Define NP problems.
(i) What is time efficiency of Merge Sort Algorithm?
(j) Find the time complexity of recurrence relation.

$$T\ n\ =\ 2T\ \sqrt{n}\ +\ 1$$

SECTION-B

Q2. Attempt any *five* questions. **10x5=50**

(a) Use a Recursion tree/Master Method to give an asymptotic tight solution to the

$$T\ n\ =\ 4T\ \frac{n}{2}\ +\ n^{2}\sqrt{n}$$

(b) What is amortized Analysis? Explain accounting method with the help of an example.
(c) Write an algorithm to sort the given array of dement using Quick-sort. Illustrate the operation of PARTITION procedure on the array $= < 2, 8, 7, 1, 3, 5, 6, 4 >$.
(d) Discuss the weighted union procedure for data structure for disjoint set and how to improve its worst case complexity.
(e) Write & Explain Dijkstra's Algorithm with the help of suitable example.
(f) Write & Explain Travelling Salesman problem.
(g) Discuss the classess P, NP, NP complete and NP hard with examples.
(h) Solve the all-pairs shortest Path problem for the digraph with the weight matrix given below:

	A	B	C	D
A	0	∞	∞	3
B	2	0	∞	∞
C	∞	7	0	1
D	6	∞	∞	0

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SECTION-C

Attempt any *two* questions. **15x2=30**

Q3. Use Stassen's matrix multiplication algorithm to multiply the following two matrices:

$$A = \begin{matrix} 3 & 2 \\ 4 & 8 \end{matrix} \qquad B = \begin{matrix} 1 & 5 \\ 9 & 6 \end{matrix}$$

What is its time complexity?

Q4. Differential between the following:

(i) Depth First & Breadth first Search

(j) Dynamic Programming & Divide/Conquer Approach.

Q5. Apply the Greedy method to solve the following instance of Knapsack problem. Item n = 7

Knapsack capacity M = 15, $P_1, P_2, \ldots . . P_7 = (10, 5, 15, 7, 6, 18, 3)$ & $\omega_1, \omega_2, \ldots \ldots \omega_7 = (2, 3, 5, 7, 1, 4, 1)$.

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