

M.C.A. DEGREE II SEMESTER EXAMINATION APRIL 2013

CAS 2203 COMPUTER ALGORITHMS
(Supplementary)

Time: 3 Hours

Maximum Marks: 50

PART A
(Answer ALL questions)

(15 × 2 = 30)

- I. (a) What are the properties of Red-Black trees?
 (b) Explain the concept of Hash tables.
 (c) Solve the recursion equation $T(n) = 2T\left(\frac{n}{2}\right) + 1$.
- II. (a) Give the principle of optimality.
 (b) Explain the divide and conquer method of solving a problem.
 (c) Describe Knapsack problem.
- III. (a) Give an algorithm for topological sort in a DAG.
 (b) Describe flow networks with an example.
 (c) Explain the branch and bound technique.
- IV. (a) What is primality testing?
 (b) Give Strassen's algorithm for matrix multiplication.
 (c) Use Strassen's algorithm to compute the matrix product $\begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} \begin{bmatrix} 8 & 4 \\ 6 & 2 \end{bmatrix}$. Show your work.
- V. (a) Explain an NP-complete problem.
 (b) Describe P class and NP class problems.
 (c) Which sort is better in worst case: quicksort or merge sort? Justify your answer.

PART B

(5 × 4 = 20)

- VI. A. Explain the different asymptotic notations used for specifying the growth rate of functions.
- OR
- B. Distinguish between binomial heap and fibonacci heap.

(P.T.O.)

VII. A. Using dynamic programming technique give an algorithm for matrix-chain multiplication.

OR

B. Explain Huffman code with an example.

VIII. A. Give an algorithm to find the strongly connected components in a directed graph.

OR

B. Explain BFS and DFS in graphs with an example.

IX. A. Describe how to compute matrix inverse from an LUP decomposition.

OR

B. Explain integer factorization.

X. A. With the help of an example, explain quick sort algorithm.

OR

B. Explain heap sort algorithm with the help of an example.
