

MCA DEGREE EXAMINATIONS: MAY/JUNE 2014

(Regulation 2013)

Second Semester

MASTER OF COMPUTER APPLICATIONS

P13CAT203:Design and Analysis of Algorithms

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

1. What is a Recurrence Equation?
2. Explain algorithm correctness.
3. Give the time complexity of binary search algorithm.
4. Define minimum spanning tree.
5. Define the term 'principles of optimality'.
6. Define Optimal binary search tree.
7. Explain the idea behind backtracking.
8. Define state space tree.
9. Define NP-problems.
10. What is NP completeness?

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

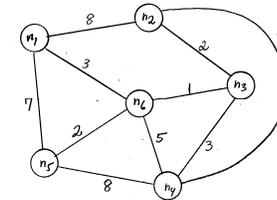
Q.No:11 is Compulsory

11. Suppose you have a set of N gold coins of which all but one have identical weight. The exception is a single fake coin that weighs less than real coins. To detect the fake, you have a scale which you can use to weight any two piles of coins. The scale will either report that the two piles are of equal weight, or if not, which of the two piles is lighter. Design an algorithm which correctly identifies the fake coin using only $\log_2 N + 1$ weightings. Justify why your algorithm achieves this bound.

12. Solve the following instances of the 0/1 Knapsack problem given the knapsack capacity is $W=8$ using dynamic programming.

Item	Weight	Value
1	1	15
2	5	10
3	3	9
4	4	5

13. Consider the following graph:



The numbers next to the edges denote the length of the edge. Determine the shortest paths between all pairs of nodes.

14. (i) Write the algorithm for quick sort and write its time complexity. (8)
 (ii) Explain Prim's algorithm with an example. (8)
15. Explain the assignment problem using branch & bound technique.
16. Explain the approximation algorithm for Traveling salesman problem.
