

**M.Sc. 2nd Semester Examination, 2012**

**COMPUTER SCIENCE**

*( Design and Analysis of Algorithms )*

PAPER— CS-203

*Full Marks : 40*

*Time : 2 hours*

**Answer Q. No. 1 and any two from the rest**

*The figures in the right-hand margin indicate marks*

*Candidates are required to give their answers in their own words as far as practicable*

*Illustrate the answers wherever necessary*

1. (a) If  $T(n) = 7 T(n/2) + 18n^2$ ,  $n \geq 2$  and  $T(n) = 1$  if  $n = 1$ . Find  $T(n)$ , when  $n$  is a power of 2.
- (b) What is tail recursion ? Give an example of tail recursion.
- (c) Define Omega ( $\Omega$ ) notation and  $\theta$  notation.

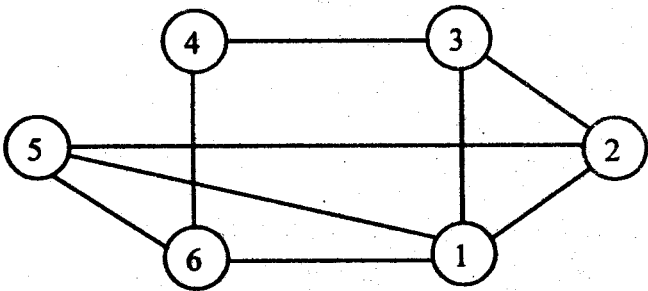
3 + (2 + 1) + 4

*( Turn Over )*

2. (a) Write the quick sort algorithm and find the best case time complexity of it.
- (b) Write an algorithm to solve traveling salesman problem and show that the time complexity of the algorithm is  $O(n2^n)$ , where  $n$  represents the number of cities. (5 + 3) + (4 + 3)
3. (a) Write the general algorithm for divide and conquer method. Find its time complexity.
- (b) Write the differences between divide conquer and greedy method.
- (c) Write an algorithm to find the maximum and minimum number from a given set of numbers using divide and conquer method. Find its time complexity. (3 + 4) + 2 + (3 + 3)
4. (a) Write an algorithm to solve single source shortest path problem. What is the time complexity of this algorithm?
- (b) Write Prim's algorithm to find a minimum spanning tree. (6 + 3) + 6

5. (a) Explain  $n$ -queen problem.
- (b) Solve the 4-queens problem using backtracking.
- (c) Write an algorithm of  $n$ -queens problem using backtracking.
- (d) Define Hamiltonian cycle. What is the Hamiltonian Cycle of the following graph?

2+4+6+3



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