MCA 2nd Semester Examination, 2012

DESIGN AND ANALYSIS OF ALGORITHM

PAPER– CS/MCA/201

Full Marks : 100

Time : 3 hours

Answer any **five** questions

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*) What are the different characteristics of an algorithm ?

(*b*) Define asymptotic Ω notation.

(*c*) Write an algorithm of Quick sort using Divide and Conquer method.

(*d*) Find out the time complexity of the following using recursion :

$$T(n) = T(n/2) + c * n \quad n > 1$$
$$= 1 \quad n = 1$$

2+2+5+5

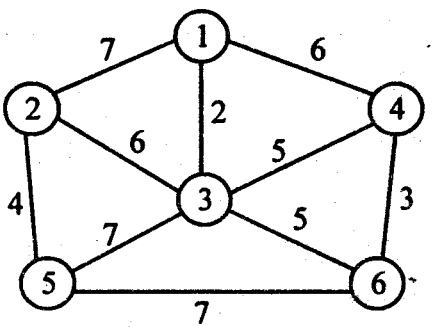
2. (*a*) Differentiate between Greedy method and Dynamic programming.

(*b*) What is the optimum solution of the following Knapsack problem using Greedy algorithm

$P = (11, 22, 32, 35)$, $W = (4, 11, 20, 15)$, $C = 40$, $n = 4$.

(*c*) Write a greedy algorithm to the job sequencing with deadlines.

(*d*) Calculate cost of the minimum cost spanning tree given below :



3+4+4+3

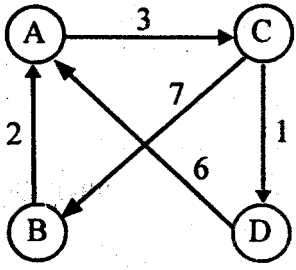
3. (*a*) What is heap property ? Write an algorithm for heap sort and find the time complexity of it.

(*b*) Describe sorting technique using partial order. (2 + 5 + 3) + 4

4. (*a*) Explain All-pair shortest-paths problem.

(*b*) Write an algorithm of All pair shortest path using dynamic programming design technique.

(*c*) Find out all pair shortest path for the following graph :



3 + 5 + 6

5. (*a*) Define *n*-queen problem. What are the exclusion criteria of *n*-queen problem ?

(*b*) Solve the 4-queens problem using backtracking.

(*c*) Write an algorithm of 8-queens problem using backtracking. 4 + 4 + 6

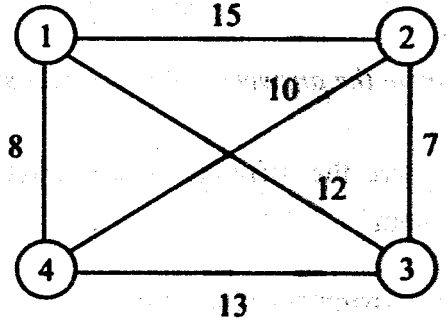
6. (*a*) What is graph coloring problem ? Write algorithm of graph coloring problem. Find the time complexity of that algorithm.

(*b*) Write an algorithm for job sequencing with deadlines. (2 + 5 + 3) + 4

7. (*a*) Write the Tower of Hanoi algorithm using recursion.

(*b*) Explain how 15 puzzle problem can be solved using Branch and Bound design technique.

(*c*) A postal van has to travel few post offices as described in the following graph. Find out route, the van should follow to achieve minimum travel starting from node 1.



3 + 5 + 6

[*Internal Assessment* : 30 Marks]