Krishna Kanta Handiqui State Open University
MCA 5th Sem. Examination, 2015

Design and Analysis of Algorithms [MCA(S5)18]

Time : 3 Hrs. Full Marks : 80

1. Answer any five from the following questions : 5×2 = 10
   (a) Define algorithm.
   (b) Define space and time complexity.
   (c) Differentiate between live node and dead node.
   (d) Define Big Omega notation.
   (e) Define Cook 's algorithm.
   (f) How is quick sort different from randomized quick sort? Explain.

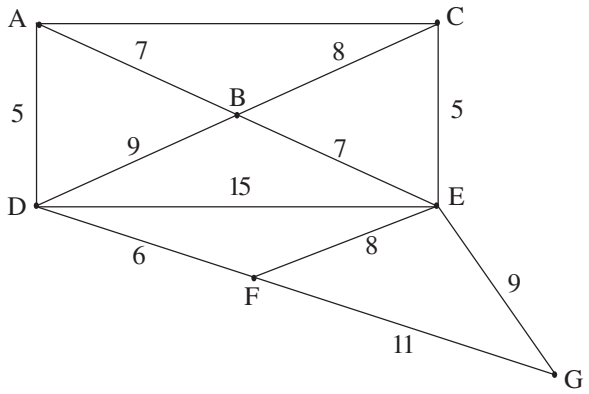
2. Answer any three from the following questions : 4×3 = 12
   (a) What are the best case time complexities of counting sort, quick sort, bucket sort and heap sort?
   (b) Explain the general strategy of divide and conquer technique in brief.
   (c) Define NP hard and NP complete classes.
   (d) Explain briefly how dynamic programming is different from divide and conquer approach.

3. Answer any three from the following questions : 6×3 = 18
   (a) Perform radix sort on the following numbers :
   [121, 334, 453, 678, 998, 234, 378, 548, 787, 934]
   (b) Give the four steps of dynamic programminng. Mention two examples.
   (c) Give the algorithm for binary search.
   (d) Perform max heap on the following numbers :
   [21, 19, 16, 55, 34, 10]

4. Answer any four from the following questions : 10×4 = 40
   (a) Describe the branch and bound strategy using an example.
   (b) Sort the following numbers using merge sort.
   [23, 41, 39, 7, 75, 63, 14, 90]
   (c) Discuss the 4-queen's problem using backtracking method. Also give the solution space.
   (d) Find the optimal solution for the (0/1) knapsack problem and fractional knapsack problem using greedy strategy where the total weight for knapsack is c = 100. The number of items is n = 3 and weight and profit for these items are shown in the table below:

Item	1	2	3
Weight (w_i)	80	30	40
Profit (p_i)	20	15	14

   (e) Find the minimum spanning tree for the graph given below using Kruskal's algorithm :



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