Code No: MC1335/R13

MCA III Semester Regular/ Supplementary Examinations, November-2016

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 Hours **Max. Marks: 60**

Answer Any **FIVE** *Questions*
All Questions Carry Equal Marks

1. a Justify the statement "Asymptotically more efficient algorithms are usually the better choice for all but small inputs" with suitable examples of notations. [6]
   b What is meant by disjoint set? Explain the applications of disjoint set data structure in terms of connected, bi-connected and minimum spanning trees. [6]

2. a Show that $f(n)+g(n)=O(n^2)$ where $f(n)=3n^2-n+4$ and $g(n)=n\log n+5$ [6]
   b Explain the control abstraction for divide and conquer with the help of binary search algorithm. [6]

3. a Trace quick sort algorithm for the given array of numbers, also show the tree calls and compute the average time complexity. [6]
   2, 7, 8, 3, 1,9, 5, 6,3
   b Write and explain the greedy method with the help of single source shortest path problem. [6]

4. a Discuss the Dynamic programming solution to construct the optimal binary search tree for the given data. [12]
   b
   N=4, (a1,a2,a3,a4)= (do, if, int, while) P(1,4)= (3,3,1,1) and q(0,4) (2,3,1,1,1)

5. a How to solve Knapsack problem with Dynamic programming? How it is different from greedy method? [4]
   b Find the shortest path between all pairs of nodes in the following graph [8]
   AD=1, BC=2, AB=5,BD=3, CD=6,AC=4

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6. a Write an algorithm for generation of next color in M coloring problem. [6]
   b Draw the tree organization of the 4-queen solution space and number the nodes using DFS. [6]

7. a Draw the portion of state space tree generated by LC branch and bound for the following instances. N=4, m=15, (p1--- p4)= (10,10,,12,18) (w1---w4)=(2,4,6,9) [8]
   b What is Branch and Bound? Explain its control abstraction. [4]

8. a State and explain the Cook's theorem. How it helps in solving NP-Problems. [6]
   b Differentiate between NP-Complete and NP-hard problems. [6]

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