

**Code No: MC1335/R13**

**MCA III Semester Regular/ Supplementary Examinations, November-2016**

**DESIGN AND ANALYSIS OF ALGORITHMS**

**Time: 3 Hours**

**Max. Marks: 60**

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*Answer Any FIVE Questions  
All Questions Carry Equal Marks*

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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 [12]  
b tree for the given data.  
 $N=4$ ,  $(a_1,a_2,a_3,a_4)=(do, if, int, while)$   $P(1,4)=(3,3,1,1)$  and  $q(0,4)=(2,3,1,1,1)$
5. a How to solve Knapsack problem with Dynamic programming? How it is different [4]  
from greedy method?  
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.  $N=4$ ,  $m=15$ ,  $(p1--- p4)=(10,10,,12,18)$  [8]  
 $(w1---w4)=(2,4,6,9)$   
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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