UKA TARSADIA UNIVERSITY

B.Tech (CE)/B.Tech (IT) (Semester: 5)
030090503(2013-14)/030080503(2013-14)
Design and Analysis of Algorithms

Date :18/11/2016 **Time :**10:00AM-1:00PM
Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Answer the following in brief. (Any 2) **[4]**

I) Define following asymptotic notations:

i. big-theta

ii. big-omega

II) Find time complexity of following recurrence relation using substitution method:
T(1)= c1
T(n)=2T(n-1) + c

III) Is $2^{2n} = O(2^n)$? Justify your answer.

Q 1 B) Answer the following . (Any 1) **[5]**

I) What is an algorithm? Explain approaches for selecting efficient algorithms.

II) Write an insertion sort algorithm and find its best case time complexity.

Q 2 A) Answer the following in brief. (Any 2) **[4]**

I) What is the recurrence relation for matrix multiplication using divide and conquer approach? Also find the time complexity.

II) State three phases of divide and conquer approach.

III) What are the differences between quick sort and merge sort algorithm?

Q 2 B) Write binary search algorithm with divide and conquer approach and perform best case and worst case analysis. [5]

OR

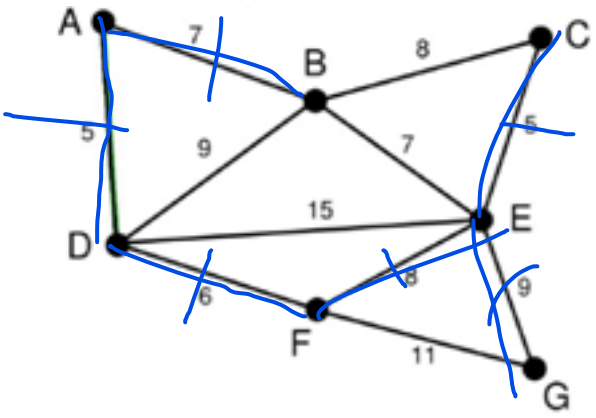
Q 2 B) Write an algorithm for quick sort and derive its execution time for best case.

Q 3 Answer the following in detail. (Any 2) **[12]**

I) Solve the following fractional knapsack problem using greedy approach. There are five items whose weights and values are given in following arrays.
Weight w[ ] = { 1,2,5,6,7 }
Value v[ ] = { 1,6,18,22,28 }
Find the optimal knapsack items for weight capacity of 11 units.

II) Derive the algorithm for making change using greedy approach with an example.

III) Generate minimum spanning tree for the following graph using Prim's algorithm. Here, A is starting node.



SECTION - 2

Q 4 A) Answer the following in brief. (Any 2) **[4]**

I) Draw finite automata for pattern "abba" and input alphabet ∑={a,b}.

II) Write an algorithm for Naïve String Matching.

III) Explain branch and bound technique.

Q 4 B) Answer the following . (Any 1) **[5]**

I) Solve the following instance of the assignment problem using branch and bound algorithm.

	J1	J2	J3	J4
a	9	2	7	8
b	6	4	3	7
c	5	8	1	8
d	7	6	9	4

II) Solve 0-1 knapsack problem using branch and bound algorithm for given weights and profits. Find maximum profit for capacity 15.

Job	Weight	Profit
A	2	10
B	4	10
C	6	12
D	9	16

Q 5 A) Answer the following in brief. (Any 2) **[4]**

I) Define: biconnected graph, sparse graph

II) Explain backtracking method.

III) Explain preorder traversal with an example.

Q 5 B) What is N-queens problem? Give solution of 4-queens problem using backtracking Method. [5]

OR

Q 5 B) Explain breadth-first search in detail.

Q 6 Answer the following in detail. (Any 2) **[12]**

I) Consider the chain of matrices A1,A2,..,A5 with the dimensions given below. Give the optimal parenthesization to get the product.

Matrix	Dimension
A1	10 X 5
A2	5 X 20
A3	20 X 10
A4	10 X 9
kA5	9 X 15

II) Explain how 0-1 knapsack problem can be solved using dynamic programming.

III) Find out longest common subsequence of following two strings using dynamic programming method:
S1 = abcbaf and S2 = acbcf.