ROLL NO. _____

Code: AC64/AT64 Subject: DESIGN & ANALYSIS OF ALGORITHMS

AMIETE – CS/IT

Time: 3 Hours **DECEMBER 2012** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. Which of the following is not the required condition for binary search algorithm?

(A) The list must be sorted
(B) There should be the direct access to the middle element in any sublist
(C) There must be mechanism to delete and/or insert elements in list
(D) None of these

b. Two main measures for the efficiency of an algorithm are

(A) Processor and memory **(B)** Complexity and capacity
(C) Time and space **(D)** Data and space

c. The time factor when determining the efficiency of algorithm is measured by

(A) Counting micro seconds
(B) Counting the number of key operations
(C) Counting the number of statements
(D) Counting the kilobytes of algorithm

d. The space factor when determining the efficiency of algorithm is measured by

(A) Counting the maximum memory needed by the algorithm
(B) Counting the minimum memory needed by the algorithm
(C) Counting the average memory needed by the algorithm
(D) Counting the maximum disk space needed by the algorithm

e. The Worst case occur in linear search algorithm when

(A) Item is somewhere in the middle of the array
(B) Item is not in the array at all
(C) Item is the first element in the array
(D) Item is the last element in the array or is not there at all

f. The complexity of linear search algorithm is

(A) O(n) **(B)** O(log n)
(C) $O(n^2)$ **(D)** O(n log n)

g. The complexity of merge sort algorithm is

(A) O(n) **(B)** O(log n)
(C) $O(n^2)$ **(D)** O(n log n)

h. The operation of processing each element in the list is known as

(A) Sorting **(B)** Merging
(C) Inserting **(D)** Traversal

i. Finding the location of the element with a given value is:

(A) Traversal **(B)** Search
(C) Sort **(D)** None of these

j. The heap data structure is useful for implementing

(A) Priority queues **(B)** Dequeue
(C) Linked List **(D)** Stacks

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain the fundamentals of algorithm problem solving. **(8)**

b. Explain various data structures used in algorithm design. Give their applications. **(8)**

Q.3 a. What is the difference between time complexity and space complexity? **(8)**

b. Write an algorithm for analyzing the efficiency of recursive algorithms. **(8)**

Q.4 a. What is the best, average and worst case inputs for the algorithm of sequential search. **(6)**

b. Explain "Divide & Conquer Technique". **(6)**

c. Explain Brute force string matching algorithm. **(4)**

Q.5 a. Define BFS. Explain with the help of example how it differs from DFS. **(8)**

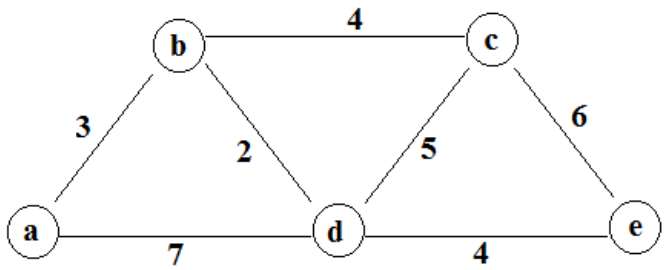
b. What is the time efficiency of the DFS based algorithm for topological sorting? **(8)**

Q.6 a. Define AVL trees. Explain four rotation types for AVL trees with three nodes. Give an illustration. **(8)**

b. Explain the heap sort in detail. Give its complexity. **(8)**

Q.7 a. With the help of example, differentiate between Prim's and Kruskal's algorithm. **(8)**

b. Using Dijkstra's algorithm, find the shortest path from a to e. **(8)**



Q.8 a. Explain the Hashing technique in detail. What is the difference between open hashing and closed hashing. Explain B-trees. **(8)**

b. What are NP, NP complete and NP hard problems? **(8)**

Q.9 a. Solve the following instance of the Knapsack problem by the branch–and-bound algorithm. (W=10) **(8)**

i	1	2	3	4
v_i	10	40	30	50
w_i	5	4	6	3

b. Write about Bisection Method for solving Non-Linear Equations. Give a suitable example to explain. **(8)**