Hall Ticket Number:

Code No.: 9133 M

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.Tech. (CBCS : CSE) I-Semester Make up Examinations, March-2017

Advanced Algorithms

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Name two techniques for resolving collisions in hash tables.
2. What are the different amortization techniques?
3. Describe the main features of the dynamic programming paradigm of algorithm design.
4. Describe breadth first search technique on undirected graphs.
5. What is a minimum spanning tree in a weighted undirected graph? Name two algorithms for computing the minimum spanning tree of a graph.
6. What is the max-flow min-cut theorem?
7. State the Chinese Remainder Theorem.
8. Solve $x = 4^{-1} \pmod{11}$.
9. Define complexity classes P and NP.
10. State Cook's theorem.

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) Describe briefly how priority queues can be implemented using heaps.
    b) Describe the algorithm for insertion into an AVL tree.
12. a) Describe the Huffman coding scheme and explain why it is a greedy algorithm.
    b) State the matrix chain multiplication problem and write a dynamic programming algorithm to solve it. And derive its time complexity.
13. a) Given a weighted digraph G = (V, E), write an algorithm to compute the shortest path from a given vertex to all vertices. The algorithm should have a worst case time complexity of O(|V||E|).
    b) Explain why the edges in the maximum network flow of a bipartite graph are the edges that correspond to the maximum matching.
14. a) Describe the Boyer-Moore string search algorithm and discuss its performance.
    b) Find the gcd of 414 and 662 explicitly using Euclid's algorithm.
15. a) Define the convex hull of a set of n points in a plane. Describe an O(nlogn) algorithm for computing the convex hull.
    b) Write an algorithm to construct a 2D-Range search tree algorithm and estimate its time complexity.
16. a) Write a divide and conquer algorithm to sort n integers in O(nlogn) steps in the worst case. Argue why its worst case complexity is O(n logn).
    b) What is the skip-list and write how to insert a new element?
17. Answer any ***two*** of the following:
    a) How to prove a problem to be NP hard using reductions?
    b) Tries data structure.
    c) The encryption and decryption process in the RSA algorithm.