Hall Ticket Number:

Code No. : 22514

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (I.T.) II Year II-Semester Main & Backlog Examinations, May-2017

Design and Analysis of 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. How asymptotic notation does relate to analyzing complexity?
2. Solve the recurrence: $T(n) = 6T(n/3)+n^2 \log n$.
3. What is Knapsack Problem?
4. Compare greedy method and dynamic programming.
5. Define principle of optimality.
6. State traveling salesman problem.
7. Relate Hamiltonian cycle from the tour of travelling salesperson.
8. List out explicit and implicit constraints of 8-Queens problem.
9. What is Decision Problem?
10. State Cook's theorem.

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

11. a) What are the collision resolution policies in hashing? Write an algorithm for Hashing with linear probing.

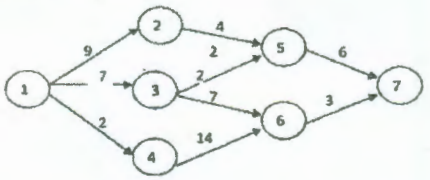
    b) Sort the following numbers 3, 16, 12, 14, 11, 15 using Heap sort. Show the step by step procedure.

12. a) Write the algorithm for Merge sort using divide and conquer.

    b) Consider a Job Sequencing scheduling problem where the 6 jobs have a profit of (10, 34, 67, 45, 23, 99) and corresponding deadlines (2, 3, 1, 4, 5, 3). Obtain the Optimum schedule. What is the time complexity of your algorithm? Can you improve it?

13. a) Discuss in detail about all pairs shortest path problem.

    b) What is a Multistage Graph? Find the shortest path in a multi stage graph using Dynamic programming for the given graph.



14. a) Write a recursive backtracking algorithm to find all the Hamiltonian cycles of a given graph.

    b) Find an optimal solution to 0/1 knapsack when (w1, w2, w3, w4) = (10, 15, 6, 9) (p1, p2, p3, p4) = (2, 5, 8, 1) Knapsack capacity = 25 where Wi's are weights and Pi's are profits.

Contd... 2

15. a) Explain what are NP-Hard and NP-Complete problems.

    b) Illustrate node cover decision problem with an example.

16. a) What is an algorithm? Explain time and space complexity of an algorithm.

    b) Write a recursive algorithm for finding both the minimum and maximum. Elements in an array A of n elements. What is the running time?

17. Write short notes on any ***two*** of the following:

    a) Biconnected components.

    b) 8-Queens Problem.

    c) Boolean Satisfiability problem.