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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD M.Tech. I Year (CSE) I-Semester (Make Up) Examinations, March-2016

Advanced Algorithms

Time: 3 hours

Max. Marks: 70

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

Part-A (10 X 2=20 Marks)

- 1. Prove or disprove that $O(2^n)! = O(2^{2n})$.
- 2. Define (binary) maximum heap.
- 3. What are different ways of representing graphs?
- 4. Give a recurrence relation for worst-case running time of quick sort.
- 5. What is the running time of the Prim's algorithm if the priority queue is implemented as a binary heap?
- 6. Explain maximum Bi-partiate matching.
- 7. Let T[1...n] be a text and P[1...m] be a pattern (m < n+1). What is the minimum number of character comparisons required to determine if P is present in T?
- 8. State Fermat's Little Theorem.
- 9. Define priority search tree.
- 10. State Cook's theorem.

Part – B (5 X 10=50 Marks)

11.	a) Write heap sort algorithm with supporting routines heapily and buildheap procedures.b) What is the advantage of AVL tree over binary search tree? Explain with a suitable example.	(6) (4)
12.	 a) Obtain a set of optimal Huffman codes for the messages (M₁, M₂, M₇) with relative frequen (q₁, q₂,, q₇)=(4,5,7,8,10,12,20).Draw the decode tree for this set of codes. b) What is task-scheduling problem? Give greedy algorithm for the task-scheduling problem. Suppose we are given a set of tasks specified by pairs of the start times and finish times as T = {(1,2), (1,3), (1,4), (2,5), (3,7), (4,9), (5,6), (6,8), (7,9)}. Solve the task-scheduling problem for this set of tasks. 	(5)
13.	 a) Write 0/1 knapsack algorithm using dynamic programming approach. Derive its time complex How it improves performance than brute force approach? b) Define the following terms and give an example for each i) Flow network ii) Maximum flow iii) Cut 	ity. (7) (3)
14.	a) What is a trie data structure? Explain with an example searching a trie for an element with a given key.b) Explain Euclid's algorithm for finding GCD with an example.	(5) (5)
15.	a) Write priority search tree algorithm.b) What is an NP-complete problem? List out four NP-complete problems. Give an example for problem, which is NP-hard but not NP-complete.	(6) a (4)
16.	 Write short notes on the following: (3+3) a) Priority queue b) Maximum bipartite matching reduced to Max-Flow. c) Quad trees 	3+4)
17.	a) Give pseudo code for Dijkstra's algorithm and illustrate the working of Dijkstra's algorithm with an example.b) What is a collision in hashing?	(8) (2)
