S 9097

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Third Semester

Computer Science and Engineering

CS 231 — INTRODUCTION TO ANALYSIS OF ALGORITHMS

Time : Three hours Maximum : 100 marks

Answer ALL questions.

SECTION A — (10 × 2 = 20 marks)

1. What is an algorithm? What is order of growth?

2. What do you mean by d-ary heap?

3. Define worst case and best case analysis.

4. What makes a good hash function?

5. What is recursion? Is it an optimal solution?

6. What is a finite automata? State its relevance in string matching?

7. What do you mean by polynomial - time solvable?

8. What are said to be strongly connected components?

9. What does the following segment refer to?

```
XXX
x ← ALLOCATENODE ( )
leaf [x] ←TRUE
n [x] ← 0
DISK WRITE (x)
root [T] ← x
```

10. Define a constraint graph.

SECTION B — (5 × 16 = 80 marks)

11. (a) Explain the binary heap data structure and state heap properties. Discuss.

Or

(b) How a graph is represented? Explain different techniques, with suitable examples. Compare their case of programmabilities.

12. (a) Write the algorithm for insertion-sort and analyse the running time complexities.

Or

(b) Write suitable algorithm for finding the largest and second largest among 1,000 numbers given. Discuss the time and spare complexities.

13. (a) Explain merge sort. How do you analyse it using divide and conquer principle. Discuss.

Or

(b) Describe Knuth-Morris-Pratt linear time string matching algorithm. Prove that its matching time is $\theta(n)$.

14. (a) Write Kruskal algorithm for finding minimum spanning tree and compare with Prim's algorithm.

Or

(b) Explain Dijkstra's algorithm for finding shortest paths in a weighted directed graph and discuss about the maintenance and termination.

15. (a) What is Hamiltonian cycle? What is polynomial time verification? Explain NP completeness and reducibility.

Or

(b) Write short notes on :

(i) Approximation algorithms

(ii) Clique problem.
