B.E DEGREE EXAMINATIONS: NOV/DEC 2013

Third Semester

CSE104: DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE / IT)

Time: Three Hours   Maximum Marks: 100

Answer ALL Questions:-

PART A (10x1=10 Marks)

1. Which of the following case does not exist in complexity theory ?

   A. Best case   B. Worst case   C. Null case   D. Average case

2. Which data structure is needed to convert a infix notation to postfix notation?

   A. Graph   B. Queue   C. Tree   D. Stack

3. Consider a linked list of 'n' elements. What is the time taken to insert an element after an element pointed by some pointer?

   A. $O(1)$ B. $O(n)$ C. $O(\log_2 n)$ D. $O(n \log_2 n)$

4. The recurrence relation capturing the execution time of the Towers of Hanoi problem with n discs is

   A. $T(n) = 2T(n - 2) + 2$ B. $T(n) = 2T(n - 1) + n$

   C. $T(n) = 2T(n/2) + 1$ D. $T(n) = 2T(n - 1) + 1$

5. Which of the following sorting procedure is the slowest?

   A. Quick sort   B. Heap sort

   C. Shell sort   D. Bubble sort

6. Which of the following sorting methods would be most suitable for sorting a list which is almost sorted?

   A. Bubble sort   B. Insertion sort

   C. Selection sort   D. Quick sort

7. The balance factor for an AVL tree is either

   A. 0,1 or –1   B. –2,–1 or 0   C. 0,1 or 2   D.   1,0 or -2

8. The complexity of searching an element from a set of n elements using Binary search algorithm is

   A. $O(n)$ B.$O(\log n)$ C. $O(n2)$ D. $O(n \log n)$

9. Travelling salesman problem solution using dynamic programming has the time complexity

   A. $O(n!)$ B. $O(n 2^n)$ C. $O(n^2 2^n)$ D. $O(n^4)$

10. Which technique is applied for solving problems like crosswords, Sudoku, puzzles?

   A. Branch and Bound   B. Backtracking

   C. Greedy technique   D. Dynamic programming

PART B (10 x 2 = 20 Marks)

11. What is Time complexity and Space complexity?

12. What is digraph?

13. Write down the general plan for the Empirical Analysis of Algorithm Efficiency?

14. Write a non-recursive algorithm for computing the nth Fibonacci number.

15. Define Brute force approach? List any 2 examples.

16. Differentiate between BFS and DFS.

17. Define Minimum Spanning Tree.

18. What is the difference between the Greedy method and Dynamic programming?.

19. What is the difference between Live node and Dead node in branch and bound?

20. State the principle of optimality.

PART C (5 x 14 = 70 Marks)

21. a) What is an algorithm? With a neat diagram explain the algorithm design and analysis process.

(OR)

   b)   Discuss the Asymptotic notations and efficiency classes with examples.

22. a) (i) Solve the recurrence relation to second-order linear recurrence for n^{th} Fibonacci Number.   (10)

   (ii) Write an non-recursive algorithm to matrix multiplication and analyse the time efficiency.   (4)

(OR)

b) (i) What is algorithm visualization and Explain two variations of visualization. (10)

   (ii) Write the general plan for Analyzing Time efficiency of Non recursive Algorithm.   (4)

23. a) Write and explain merge sort algorithm .Sort the following list using Merge sort.

      8, 3, 2, 9, 7,1,5, 4

(OR)

b) (i) Explain Depth First Search Algorithm with suitable example.   (7)

(ii) Explain the Algorithm for Selection sort with suitable example.   (7)

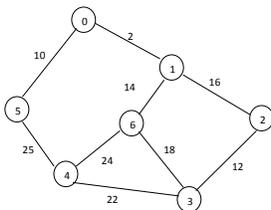24. a) (i) Construct an AVL Tree for the following list by successive insertion

      5, 6, 8, 3, 2, 4,7   (4)

(ii) Write and explain Heap sort algorithm with suitable example.   (10)

(OR)

b) Explain Prim's algorithm. Generate minimum cost spanning tree for the following graph using Prim's Algorithm.

25. a) (i) Solve the following instance of 0/1 knapsack problem given knapsack capacity W=7   (7)

Item	weight	value
1	5	6
2	4	5
3	3	4

(ii) Explain how does backtracking work on the 4 queen problem?   (7)

(OR)

b) Explain Traveling Salesman Problem with suitable weighted graph and state – space tree to find the shortest Hamiltonian circuit of the graph.

****