

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007

Third Semester

Electrical and Electronics Engineering

CS 1211 --- DATA STRUCTURES AND ALGORITHMS

(Common to Electronics and Instrumentation and Instrumentation and Control Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A - (10 × 2 = 20 marks)

1. How do you initialize arrays in C? Justify an array as ADT.
2. Define a structure within a structure. What is its scope?
3. How do you change any value in a stack, whose position is not 'TOP'?
4. How priority queue is implemented?
5. How do you represent a node of a binary tree?
6. Define a threaded binary tree. Where are they used?
7. How do you compute the efficiency of a sorting algorithm?
8. What is pre requisite for binary search? Compare with ternary search.
9. What do you mean by shortest path in a graph? What is the practical application?
10. How weighted graphs are represented? Is it possible to find the path length between any two nodes?

PART B — (5 × 16 = 80 marks)

11. (i) How two sorted linked lists are merged to produce a single sorted list? Give an algorithm and explain with example. (8)
- (ii) How stack is used in recursive processes? How do you remove nodes from a linked list implementation of a stack? Explain. (8)

12. (a) Write a C program for finding whether the given matrix is lower triangular. If so, perform matrix multiplication with the given matrix and its transpose. Else find the frequency of occurrences of each value in the given matrix. Assume the size of the given matrix is $n \times n$ where $n > 15$ but less than 20. (16)

Or

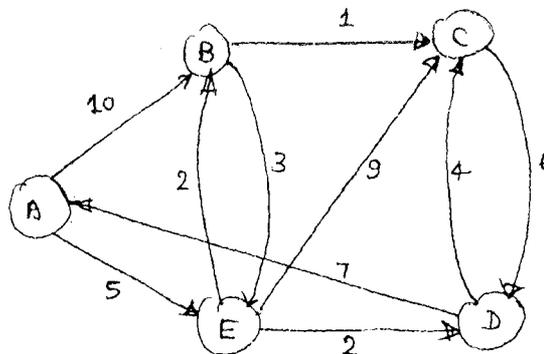
- (b) (i) What is direct recursion? indirect recursion? How fibonacci sequence is computed using a C function? How do you find the efficiency of recursion in this program? (1 + 1 + 3 + 3)
- (ii) What are various parameter passing techniques in C? Illustrate. (8)
13. (a) How a binary tree is represented and implemented in C? What is meant by tree traversals on a binary tree? Explain the three traversal along with their applications. (4 + 4 + 8)

Or

- (b) (i) Write an algorithm to find the kth element of a binary tree. (6)
- (ii) How trees are used for evaluation of an expression? Explain with an algorithm and example. (4 + 6)
14. (a) Write the algorithms for bubble sort and selection sort. Compare the performances with that of heap sort. (5 + 5 + 6)

Or

- (b) Explain the sequential and interpolation search methods. Compare their performances with binary search. (5 + 5 + 6)
15. (a) Explain Dijkstras' algorithm for solving the single source shortest path problem on a weighted directed graph and solve the following. (10 + 6)



Or

- (b) (i) What is meant by minimum spanning tree? (4)
- (ii) Explain DFS and BFS traversals and find their efficiencies. State their applications. (5 + 5 + 2)