

J--2231/015

M.C.A. EXAMINATION

May 2001

(Second Semester)

MCA-201

2231/015 = 1/3

DATA STRUCTURE AND ALGORITHMS

Time : 3 Hours

Maximum Marks : 80

Note : Attempt any five questions. All questions carry equal marks.

1. (a) The following is an array of names:

|       |       |       |      |         |         |       |
|-------|-------|-------|------|---------|---------|-------|
| Names | Allen | Clark | Dick | Edwards | Goodman | Hobbs |
|-------|-------|-------|------|---------|---------|-------|

How many comparisons would be required to search 'Edwards' using binary search. 4

(b) Write a recursive algorithm for binary search. 6

(c) Suppose A is a sorted array with 200 elements and suppose a given element x appears with the same probability in any place in A. Find the worst case running time  $f(n)$  and the average case running time  $g(n)$  to find x in A using binary search algorithm. 6

2. An array A contains 25 integers. Write an

algorithm to find all pairs of elements whose sum is 25 5

(b) Write an algorithm to delete the last node from a linked list. 6

(c) Discuss the advantages of a two way list over one way list. 5

(a) The following is a linked list :



Write an algorithm to sort the linked list in ascending order of its into fields. Do it by manipulating pointers and not the into fields. 8

(b) Translate the following expression from infix to postfix:

$$((A + B) / D) * ((E - F) * G). \quad 4$$

(c) Consider the following arithmetic expression P and evaluate it using a stack: 4

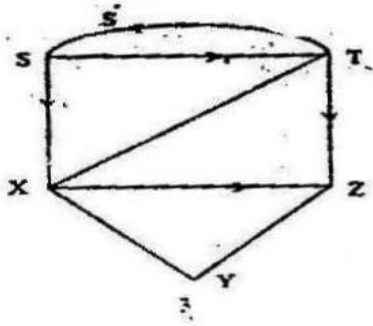
$$P : 12, 7, 3, -, 1, 2, 1, 5, +, *, +.$$

(c) BACDE

The above data is sorted using quick sort. Does the above data make nearly best or nearly worst case for quick sort. Show the first reduction.

(133)

$$2231 \mid 015 = 2/3$$



Suppose the nodes are in order X, Y, Z, S, T:

- (i) Find the adjacency Matrix A of G
  - (ii) Find the path matrix P of G
  - (iii) Is G strongly connected? 10
2. (b) Write an algorithm to find the path matrix. 6
- (c) Write any three application fo graphs. 5
- (c) Write an algorithm to insert an edge into a linked implementation of a graph. 5
- (c) Write a short note on Balanced Trees. 6

2281/015 = 3/3