WINTER-2015

UNIT 1

Q.1 a) Consider algorithm which finds the location LOC and the value MAX of the largest element in an array DATA with n elements. Consider the complexity function C(n), which measures the number of times LOC and MAX are, updated in steps:

i. Describe and find c(n) for the worst case.

ii. Describe and find c(n) for the best case.

iii. Find c(n) for the average case when n = 3, assuming all arrangements of the elements in DATA are equally likely. **(8)**

b) What is data structure? What are the types of data structures? **(5)**

Q.2 a) Write the procedure FIND(DATA, N, LOC1, LOC2) which finds the location LOC1 of the largest element and the location LOC2 of the smallest element in an array DATA with N>1 elements. **(6)**

b) Write the slow pattern matching algorithm and obtain an expression for its worst case complexity. **(7)**

UNIT 2

Q.3 a) Explain sparse matrices and give its memory representation. **(6)**

b) Consider the string S = 'PEOPLE'. Apply Bubble sort to arrange the characters in S in alphabetical order. Show all passes. Also find the number of comparisons number of exchanges. **(7)**

Q.4 a) Define Record structures. Explain reorientation of records in memory with examples. **(5)**

b) Suppose the multi-dimensional arrays A and B are declared using.

A (-2:2, 2:22) and B (1:8, -5:5, -10:5)

i. Find the length of each dimension and number of elements in A and B.

ii. Consider the element B[3,3,3] in B. Find the effective indices E_1, E_2, E_3 and the address of the element assuming Base(B) = 400 and there are W=4 records per location. **(8)**

UNIT 3

Q.5 a) Describe garbage collection and their memory allocation. **(6)**

b) Assume the LIST1 is a linked list in memory. Write an algorithm to copy LIST1 to another linked list LIST2. **(8)**

Q.6 a) Write the advantages of two way list over a one way list for following operations:

i. Traversing the list to process each node.

ii. Searching an unsorted list fir a given element ITEM.

iii. Inserting a node after the node with a given location LOC.

iv. Searching a sorted list for given element ITEM.

v. Deleting a node where location LOC is given.

vi. Inserting a node before the node with a given location LOC. **(8)**

b) Let P(x) denote the following polynomial:

$P(x) = 9x^3 - 7x^2 - 3x + 8$

Give the diagram to represent P(x) by header list. Draw an array representation of this header list. **(6)**

UNIT 4

Q.7 a) What is a queue? Write algorithm for insertion and deletion from array representation of a queue. **(8)**

b) Consider the following arithmetic expression P written in postfix notation.

P: 5, 6, 2, +, * 12, 4, /, -

Evaluate P using the algorithm for evaluation of postfix expression. Show the stack contents at each step. **(6)**

Q.8 a) Explain following:

i. Deques, **ii.** Priority queues, **iii.** Stack. **(6)**

b) Use quick algorithm to find the final position of first character D in the following list.

DATASTRUCTURES. **(8)**

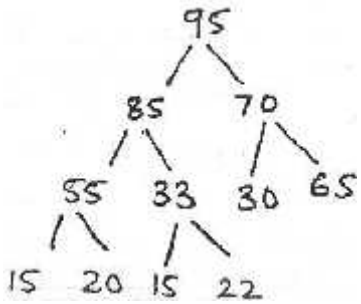
UNIT 5

Q.9 a) Suppose P Q R S T U V W are 8 data items with a weight of 22, 10, 12, 25, 21, 31, 35, 15 respectively. Apply Huffman's algorithm to construct a tree T with minimum weighted path length. **(7)**

b) Find the preorder and post-order of the following algebraic expression:

[a + (b - c)] * [(d - e)/cf + g- h)] **(6)**

Q.10 a) What is Heap? Suppose H is Heap and we want to delete the root of H. Explain the steps of re-heaping by considering the following heap. **(7)**



b) Explain the following: **(6)**

i. m-way search trees, **ii.** Binary tree, **iii.** Binary search tree.

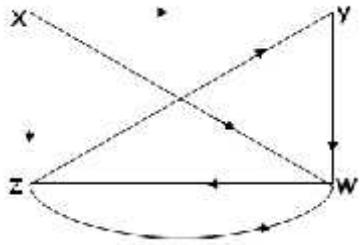
UNIT 6

Q.11 a) Sort the following elements by using Radix sort algorithm and find its complexity:

348, 143, 361, 423, 538, 128, 321, 543, 366. **(6)**

b) Explain in detail Warshall's algorithm with example. **(7)**

Q.12 a) Find the adjacency matrix A of the following graph G. Also explain whether G is strongly connected of not. **(6)**



b) Explain merge sort and sort the following 14 elements.

66, 33, 40, 22, 55, 88, 60, 11, 80, 20, 50, 44, 77, 30 **(7)**