## SUMMER-2017

## UNIT-1

**Q.1 a)** Prove that complexity of first pattern matching algorithm is O(n2). **(7)**

**b)** Consider the pattern p=abc. Use slow pattern matching algorithm to find number of comparisons to find the INDEX of P in each of the following texts T.

**i.** $a^{20}$, **ii.** $(abc)^{10}$, **iii.** $(cbab)^{10}$, **iv.** $d^{10}$. **(7)**

**Q.2 a**) Consider the pattern p = aaabb. Construct the table and the corresponding labled directed graph used in the 'fast' pattern matching algorithm. **(7)**

**b)** Describe in brief the meaning of static, semi-static and dynamic character variables. Give the advantages of each. **(7)**

## UNIT-2

**Q.3 a)** Using Bubble sort algorithm to find the number of comparisons and number of interchanges which alphabetize the latter NAGPUR (i.e. sorted to AGNPRU). Show all the intermediate steps in each pass. **(7)**

**b)** Suppose a company keeps a linear array YEAR (1920: 1970) such that the YEAR [K] contains the number of employees born in year k. Write module for each of the following tasks. **(6)**

**i.** To print each of the years in which no employees was born.

**ii.** To find the number NNN of years in which no employees was born.

**iii.** To find the number N50 of employees who will be at least 50 years old at the end of the year (Assume 1984 current year).

**iv.** To find the number NL of employees who will be at least L years old at the end of the year (Assume 1984 current year).

**Q.4 a)** An array A contains 25 positive integers write a module watch.

**i.** Finds all pairs of elements whose sum is 25.

**ii.** Finds the number EVNUM of elements of A.

**iii.** Which are even, and the number ODNUM of elements of A which are odd. **(7)**

**b)** A collage uses the following structure for a graduating class: **(6)**

1 Student (200)

2 Name

3 Last

3 First

3 Middle Initial

2 Major

2 SAT

3 Verbal

3 Math

2 GPA (4)

2 CUM.

here GPA (k) refers to the grade point average during the kth year and cum refers to the cumulative grade point average.

How many elementary items are there in the file?

How does one access

The major of the eighth student and

The sophomore GPA of the forty-fifth student?

Find output **a.** Write: Name [15]

**b.** Write: CUM

**c.** Write: CGA [2]

**d.** Write: GPA [1, 3].

## UNIT-3

**Q.5 a)** What is header Linked List? Explain with example different kinds of header linked lists. **(6)**

**b)** Consider the following polynomial

P(x, y, z) = 2xy2z3 + 3x2yz2 + 4xy3z + 5x2y2 + 6y3z + 7x3z + 8xy2z5 + 9.

- **i.** Rewrite the polynomial so that terms are ordered lexicographically.
- **ii.** Suppose the terms are stored in parallel arrays COEF, XEXP, and ZEXP with header node first. Assign values to an array LINK so that the Linked List contains the ordered sequence of terms. **(7)**

**Q.6 a)** Suppose NAME1 is a list in memory. Write algorithm which copies NAME1 into NAME2. **(7)**

**b)** Give and explain the algorithm that deletes the node N with location LOC. LOCP is the location of the node which precedes N or when N is the first Node LOCP = NULL. **(6)**

## UNIT-4

**Q.7 a)** Using stack, translate the infix expression into equivalent postfix expression. Show all steps.

Q: ((A + B) * D) ↑ (E – F). **(7)**

**b)** What is deque? Give its representation. List and explain the different variation of deque. **(7)**

**Q.8 a)** Suppose S contains following n = 5 letters.

(A) B C D (E) find the number of comparisons to sort S using quicksort. What general conclusion one can make if any? **(7)**

**b)** Let a and b denote positive integers suppose a function Q is defined recursively as follows.

$$Q(a,b)=\begin{cases}0 & \text{if } a<b\\ Q(a-b,b)+1 & \text{if } b\le a\end{cases}$$

Find the values of Q (2, 3) and Q (14, 3). **(7)**

## UNIT-5

**Q.9 a)** Explain the following with example. **(6)**

**i.** One-way inorder threading.

**ii.** Two-way inorder threading.

**iii.** Two-way threading with header node.

**b)** Suppose we have 8 data items and corresponding weights are assigned to it.

| Data item : | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| Weight : | 22 | 5 | 11 | 19 | 2 | 11 | 25 | 5 |

Construct the tree T with minimum-weighted path length using the above data and Huffman's algorithm. **(7)**

**Q.10 a)** Consider the algebraic expression **(7)**

$E = (2x + y)(5a - b)^3$

**i.** Draw the tree T which corresponds to E.

**ii.** Find preorder traversal of Tree T.

**iii.** Find postorder traversal of Tree T.

**b)** Explain the sequential representation of Binary tree in brief. **(6)**

## UNIT-6

**Q.11 a)** Suppose array A contains 14 elements as follows.

66, 33, 40, 22, 55, 88, 60, 11, 80, 20, 50, 44, 77, 30

Apply merge sort algorithm this list in ascending order show all passes and result. **(7)**

**b)** Explain Warshall's algorithm for finding the shortest path with suitable example. **(6)**

**Q.12 a)** Explain the algorithm for Depth first search. **(6)**

**b)** Suppose 9 cards are punched as follow.

348, 143, 361, 423, 538, 128, 321, 543, 366

Apply radix sort to sort the numbers in three passes. **(7)**