

## WINTER-2014

### UNIT 1

**Q.1 a)** What do you mean by Algorithm? Explain how to measure the complexity of Algorithm with example. (6)

**b)** Explain the first pattern matching algorithm. (8)

**Q.2 a)** Consider the pattern  $P = abc$ . Using the slow pattern matching algorithm find the number of comparisons to find the index of  $P$  in the following texts  $T$ :

**i.**  $d^{20}$ ,    **ii.**  $(abc)^{10}$ ,    **iii.**  $(cbab)$ ,    **iv.**  $d^{10}$ . (8)

**b)** Write procedure to find the location LOC1 of the largest element and the location LOC2 of the second largest element in an array. (6)

### UNIT 2

**Q.3 a)** Suppose a 3D array MAZE is declared using MAZE (2:8, -4:1, 6:10) Base (MAZE) = 200 and  $m = 4$  words per memory cell. Find the location of MAZE [5, -1, 8] in row major order and in column major order also. (7)

**b)** Give and Explain Binary search algorithm. (6)

**Q.4 a)** Using the bubble sort algorithm, find the number  $C$  of comparisons and the number  $D$  of interchanges which alphabetize the  $n = 6$  letters in PEOPLE. (6)

**b)** Explain the concept of sparse matrices. Also explain its representation in memory. (7)

### UNIT 3

**Q.5 a)** Suppose LIST is a header (circular) list in memory. Write an algorithm which deletes the last node from the list. LIST. (6)

**b)** Consider the polynomial

$$P(x, y, z) = 2xy^2z^3 + 3x^2yz^2 + 4xy^3z + 5x^2y^2 + 6y^3z + 7x^3z + 8xy^2z^5 + 9$$

**i.** Rewrite the polynomial so that terms are ordered lexicographically.

**ii.** Suppose the terms are stored in parallel arrays COEF, XEXP, YEXP and LEXP with the header node first. Assign values to an array LINK so that list contains ordered sequence of terms. **(7)**

**Q.6 a)** What are a two linked list? List and explain different operation on two way lists. **(6)**

**b)** Discuss the advantages of a two way list over a one-way list. **(7)**

#### UNIT 4

**Q.7 a)** What is a STACK? Give the procedure to push and pop the item into linked STACK. **(7)**

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

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

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

**Q. 8 a)** What is QUEUE? Give the procedure to insert and delete an ITEM into a linked queue. **(7)**

**b)** Find the number of comparisons to sort list using quicksort:

41 79 65 35 21 48 59 87 52 28. **(7)**

#### UNIT 5

**Q.9 a)** A binary tree T has 9 nodes. The inorder and preorder of T yields the following sequence of nodes:

Inorder E A C K F H D B G

Preorder F A E K C D H G B

Draw the tree T. **(6)**

**b)** Construct a 3-way search tree for the list of keys in the order shown below:

List A: 10, 15, 20, 25, 30, 35, 40, 45

List B: 20, 35, 40, 10, 15, 25, 30, 45. (7)

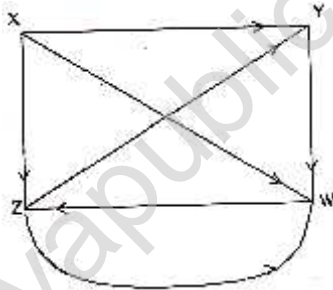
**Q.10 a)** Write an Explain an algorithm for post-order traversal of tree. (7)

**b)** Suppose a binary tree T is in memory, write the recursive procedure which finds number of nodes NOM in T. (6)

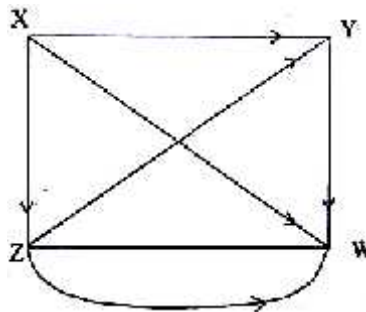
## UNIT 6

**Q.11 a)** Explain hash Table and various types of hash functions. (6)

**b)** Consider the graph G. Find the path matrix P of G using Warshall's algorithm. (7)



**Q.12 a)** Consider the graph G where nodes are stored in an array data as:



**i.** Find the adjacency matrix A of the graph G.

**ii.** Find the path matrix P of G using powers of adjacency matrix. (6)

**b)** Consider the following 4-digit employee number. Find the 2-digit hash address of each number using folding method, without reversing and the folding method with reversing using division method ( $m=97$ ) and the mid square method:

9614, 5882, 6713, 4409, 1825.

**(7)**

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