

SUMMER – 2023

UNIT-1

Q.1 a) Give the comment on “Algorithm and Complexity” along with example. (7)

b) Consider the pattern $P = abc$. Calculate number of comparisons to find the index P in the following text using slow pattern matching algorithm.

i) $(bca)^8$ **ii)** $(ab)^{10}$ **iii)** $(abc)^5$ **iv)** $(cbab)^{10}$ (7)

Q.2 a) Consider the pattern $P = aba^2b$. Construct the table and corresponding directed labelled graph used in second pattern matching algorithm. (7)

b) Prove the complexity of first pattern matching algorithm is $O(n^2)$. (7)

UNIT-2

Q.3 a) Consider the string $S = \text{'JUNGLE'}$. Apply bubble sort to arrange the characters in S in alphabetical order. Show all passes. Also find number of comparisons and number of interchanges. (7)

b) Give and explain the algorithm for Binary search. (6)

Q.4 a) Consider the linear arrays $A(5:50)$ $B(-5:10)$ and $C(18)$.

i) Find the number of elements in each array.

ii) Suppose $\text{Base}(A) = 300$ and $w = 4$ words per memory cell. Find the address of $A[15]$, $A[35]$ and $A[55]$. (7)

b) Give the comment on Record and Record Structure. (6)

UNIT-3

Q.5 a) Consider the following 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 the terms are ordered lexicographically.

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

b) Explain the following terms in detail.

Also show how these are handled.

i) Garbage collection.

ii) Overflow.

iii) Underflow. (6)

Q.6 a) Write the algorithm for deleting a given node from list with example. (7)

b) Describe the linked list structure. Illustrate with an example the traversing of linked list. (6)

UNIT-4

Q.7 a) Consider the following infix expression convert it into postfix expression by using inspection and hand method.

i) $(A - B) * (D / E)$

ii) $(A + B \uparrow D) / (E - F) + G$

iii) $A * (B + D) / E - F * (G + H / K)$ (7)

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

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

i) Find the values of $Q(2, 3)$ and $Q(14, 3)$

ii) What does this function do? Find $Q(5861, 7)$ (7)

Q.8 a) Suppose A is the following. List of 12 numbers.

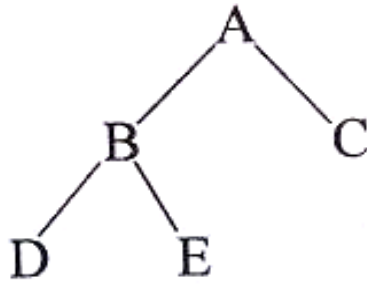
44, 33, 11, 55, 77, 90, 40, 60, 92, 22, 88, 66

Arrange the list in ascending order by using quick sort algorithm. Show all steps. (7)

b) What is queue? Write the algorithm for insertion and deletion from array representation of a queue. (7)

UNIT-5

Q.9 a) What is one way and two way in order threaded binary tree? Draw the same for given binary tree. (7)



b) Suppose an array A contains 8 elements as follows:

4, 3, 2, 10, 12, 1, 6, 5

Apply insertion sort algorithm to arrange this list in ascending order. Show all passes and result. (6)

Q.10 a) A binary tree T has 9 nodes. The inorder and preorder traversal 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. (7)

b) Consider the following data items and corresponding weights as follows.

Data	A	B	C	D	E	F	G	H
------	---	---	---	---	---	---	---	---

Item:

Weight:	2	7	24	32	37	42	42	120
---------	---	---	----	----	----	----	----	-----

Construct the Huffman's tree. (6)

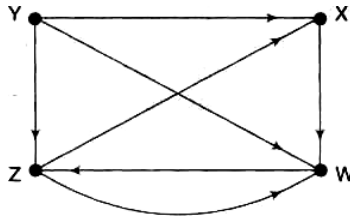
UNIT-6

Q.11 a) Suppose 9 cards are punched as follows 384, 143, 361, 423, 538, 128, 321, 543, 366 Given to a card sorter. Apply Radix sort to sort the numbers in three phases. What is the complexity of Radix sort algorithm? **(7)**

b) Write the algorithm for depth first search of a graph. **(6)**

Q.12 a) Consider the graph G whose nodes are stored in array DATA as follows.

Data: X, Y, W, Z



i) Find adjacency matrix A of graph G

ii) Find path matrix P of graph G

iii) Is graph strongly connected? **(7)**

b) Explain Linked representation of graph and hence describe the traversal of the graph. **(6)**