WINTER-2019

UNIT-1

Q.1 a) For each of following patterns P and Texts T, find the numbers C of comparisons to find INDEX of P in T using the 'Slow Algorithm'. **(7)**

i. P = abc, T = $(ab)^5$

ii. P = aaa, T = $(aabb)^3$

iii. P = abc, T = $(ab)^{2n}$

b) Write an algorithm for Linear search and obtain an expression for its complexity. **(6)**

Q.2 a) Consider the following strings; **(7)**

S = 'JOHN PAUL JONES'

T = 'A THING OF BEAUTY IS A JOY FOREVER'

Determine

i. INDEX (S, 'JO')

ii. INDEX (S, 'JOY')

iii. INDEX (S, '□JO')

iv. INDEX (T, 'A')

v. INDEX (T, 'THE')

vi. SUBSTRING (S, 4, 8)

vii. SUBSTRING (T, 10, 5)

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

UNIT-2

Q.3 a) Suppose multidimensional arrays A and B are declared using A(-2 : 2, 2 : 22) & B(1 : 8, -5 : 5, -10 : 5) **(7)**

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

ii. Consider the elements B[3, 3, 3] in B. Find effective indices E_1, E_2, E_3 and the address of the elements, assuming Base (B) = 400 and w = 4 words per memory locations.

b) Write an algorithm which deletes the k^{th} elements from Linear Array? With example. **(6)**

Q.4 a) Using bubble sort algorithm, find the number C of comparisons and the number D of interchanges which alphabetize the n = 8 letters in AMRAVATI. **(7)**

b) Suppose a hospital keeps a record of each Newborn baby which contain following data items: Name, Sex, Birthday, Father, Mother. Suppose that Birthday is a group item with subitem Month, Day, Year and Father and Mother are group items each with subitems Name and Age. **(6)**

i. Draw corresponding hierarchical structure.

ii. Which of the item are elementary items.

UNIT-3

Q.5 a) Explain Linked List and insert a node into middle of linked list with example. **(7)**

b) Write an algorithm to delete a node from doubly linked list. **(7)**

Q.6 a) Write an algorithm for traversing a circular header list. **(7)**

b) Consider the alphabetized list of patients: **(7)**

	1	Kiran	7
START	2		6
5	3	Deepak	11
	4	Manoj	12
AVAIL	5	Arun	3
10	6		0
	7	Lalit	4
	8	Gauri	1
	9	Sahil	10
	10		2
	11	Fatima	8
	12	Nancy	9

Determine the changes in data structure if:

i. Walter is added to list and then

ii. Kiran is deleted and then

iii. Rohit is added then **iv.** Sahil is deleted

Draw the diagrammatic representation after every change.

UNIT-4

Q.7 a) Consider following stack where STACK is allocated N = 4 memory cells: **(7)**

STACK:	aaa	bbb	ccc
TOP:	1	2	3

Describe the stack as the following operations take place:

i. Push (STACK, ddd)

ii. Push (STACK, eee)

iii. Push (STACK, fff)

b) Write an algorithm to evaluate postfix expression and solve following with the help of algorithm. **(7)**

P : 3, 6, 2, +, *, 12, 3, /, -

Q.8 a) Consider the following stack, where STACK is allocated N = 6 memory cells: **(7)**

STACK : AAA, DDD, EEE, FFF, GGG

Describe the stack as the following generation take place.

i. PUSH (STACK, KKK) **ii.** POP (STACK, ITEM)

iii. PUSH (STACK, LLL) **iv.** PUSH (STACK, SSS)

v. POP (STACK, ITEM) **vi.** PUSH (STACK, TTT)

b) Suppose S is the following list of 14 alphabetic characters: **(7)**

DATASTRUCTURES

Suppose the characters in S are to be sorted alphabetically. Use quick sort algorithm to find the final position of first characters D. Show intermediate steps.

UNIT-5

Q.9 a) Explain the following terms: **(7)**

i. Complete binary tree. **ii.** Heap **iii.** Binary search tree

b) Write an algorithm for inorder traversal of a binary tree T. **(6)**

Q.10 a) Write an algorithm for post order traversal of a binary tree T. **(6)**

b) Consider following six numbers are inserted in order into an empty binary search tree: **(7)**

40, 60, 50, 33, 55, 11

Draw six stages of development of this tree.

UNIT-6

Q.11 a) Explain Warshall's algorithm with example? **(6)**

b) Sort the following 8 elements by using insertion sort. Also explain complexity of insertion sort algorithm. **(7)**

77, 33, 44, 11, 99, 22, 66, 55

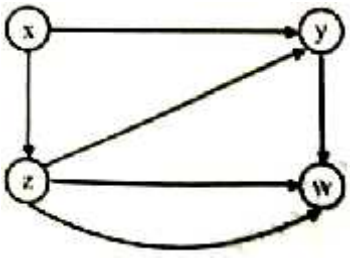
Q.12 a) Consider a directed graph G. **(6)**

i. Find all simple paths from X to Z.

ii. Find all simple paths from Y to Z.

iii. Find indeg (Y) and outdeg (Y).

iv. Is there any sink code?



b) Apply selection sort to the following list of elements. **(7)**

46, 35, 13, 57, 79, 92, 42, 62, 99, 24, 90, 68