**LAB 4: ARRAYS CSE A**

**For all of the following question, read N (get the value of N from the user) elements in to an array and proceed**

1. Write a C Program to Calculate Sum & Average of an Array
2. Write a C program to find the largest and smallest element of the array
3. Write a C Program to Put Even & Odd Elements of an Array in 2 Separate Arrays
4. Write a C Program to Insert an Element in a Specified Position in a given Array
5. Write a C Program to Delete the Specified Integer from an Array
6. Write a C Program to Cyclically Permute the Elements of an Array
7. Write a C Program to Print the Number of Odd & Even Numbers in an Array
8. WC Program to Find 2 Elements in the Array such that Difference between them is Largest
9. Write a C Program to Print All the Repeated Numbers with Frequency (number of occurances) in an Array
10. Write a C program to implement the following sorting algorithms

* Selection Sort
* Bubble Sort
* Insertion Sort

Your Program should give options for the user to select the sorting method. Display the total number of swaps for each method.

1. Write a C program to search for an element in an array. Implement both **Linear Search and Binary Search.**
2. Given an array of binary numbers (can be user-given), write a C Program to find out both the minimum length subarray as well as the maximum length subarray such that the sum of sub-arrays is equal to a user given sum value. Your program should print original array, atleast one possible minimum sub-array, at least one possible maximum sub-array and the sum. *Note that a sub-array should be a continuous array*. [15 Marks][CO4]

Given {0, 1, 0, 0, 1, 0, 1, 0} and the sum as 2 the minimum sub-array should be {1, 0, 1} and the maximum sub-array should be {1, 0, 0, 1} or {1, 0, 1, 0} or {0, 1, 0, 1}

1. Given an array of positive integers of length n, write a c program that applies sum operations to array elements such that the resultant elements in the array (as many as possible) is divisible by 4. Each sum operation constitutes taking any two elements from the array, removing both and putting back their sum in the array

For example given the array {2, 2, 2, 3, 3, 1}

First operation: pick 2 and 2, sum them and put back 4 i.e. {4, 2, 3, 3, 1}

Second operation: pick 3 and 3, replace them with their sum i.e. {4, 2, 6, 1}

Third operation: pick 2 and 6, replace them with their sum i.e. {4,8,1} (Note that this example provides one possible sequence of operations. There could be other possibilities too!! Note that 1 has been left untouched in this particular sequence of sum operations)

Given the array {4, 2, 2, 6, 6, 1} then {4, 2, 2, 6, 6, 1} → {4, 2, 8, 6, 1} → {4, 8, 8, 1} (Note that the array {4, 8, 8, 1} could still be reduced to {4, 12, 1} and then to {16, 1}. However, we want the array to have maximum resultant elements as possible divisible by 4 so we stop there.)

1. Given an array of size n of integers in range from 1 to n, write a C Program to find the inverse permutation of that array. An inverse permutation is a permutation which you will get by inserting position of an element at the position specified by the element value in the array. Validate the resultant array by giving it as input to the function to get the original array back!! [15 Marks][CO4]

For example given an array {2, 3, 4, 5, 1} the output should be {5, 1, 2, 3, 4} because of the following conversions (assuming that positions start from 1)

value 2 in position 1 becomes value 1 in position 2

value 3 in position 2 becomes value 2 in position 3

value 4 in position 3 becomes value 3 in position 4

value 5 in position 4 becomes value 4 in position 5

value 1 in position 5 becomes value 5 in position 1

1. Given an array of non-negative integers, write a C Program to find the minimum number of elements such that their sum should be greater than the sum of the rest of the elements of the array.                                                   [15 Marks][CO4]

Given {3, 1, 7, 1} the output should be 1 element (i.e. {7}) since 7 is greater than the sum of the rest of the elements i.e 3+1+1 = 5

Given {2, 1, 2} the output should be 2 elements (i.e. {2,1} or {1,2} or {2,2}) since 3 and 4 is greater than the sum of the rest of the elements i.e 2 and 1 respectively.