CL-217
Object Oriented Programming

Objectives:

- File handling
- Pointers
- Pointer Variable Declarations and Initialization
- Referencing/Dereferencing & Functions
- DMA

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of every **task outputs in MS word and do not submit .cpp file with word file**.
7. First think about statement problems and then write/draw your logic on copy.
8. After copy pencil work, code the problem statement on MS Studio C++ compiler.
9. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Microsoft teams. (Make sure your submission is completed).
10. Please submit your file in this format 19F1234_L4.
11. Do not submit your assignment after deadline.
12. Do not copy code from any source otherwise you will be penalized with negative marks.

Problem 1: | (Arrays with pointers, Passing pointers to functions as argument)

Write a C++ function swap() that takes pointer array and array size as argument and swap its values across center. The size of array should be an odd number.

Example: suppose values are 2 5 6 7 8

Before function call (Input) : 2 5 6 7 8

After function call (Output): 8 7 6 5 2

Problem 2: | (Arrays with pointers, Passing pointers to functions as argument)

```
1.  void Double ( int );
2.  int Triple ( int * );
3.  int Change ( int * );
4.
5.  void main ( )
6.  {
7.  int Number = 5;
8.  int Result = 8;
9.  int Var = 2;
10.
11. Double ( Number );
12. Result = Triple ( &Number );
13. Var = Change ( &Number );
14. Double ( Result );
15. Result = Triple ( &Var );
16. }
17.
18. void Double ( int Var )
19. {
20. Var *= 2;
21. }
22.
23. int Triple ( int * ptr )
24. {
25. return *ptr * *ptr * *ptr;
```

```
26. }
27.
28. int Change ( int *Num )
29. {
30. int Z = 5;
31.
32. Z = Z * 3;
33. *Num = *Num + Z;
34. return *Num;
35. }
```

Answer following questions with reason.

- What would be the value of the variable Number after statement 13 finished executing?
- What would be the value of the variable Var after statement 14 finished executing?
- What would be the value of the variable Result after statement 15 finished executing?
- What would be the value of the variable Result after statement 16 finished executing?
- What would be the value of the variable Z in function Change after statement 16 finished executing?

Problem 3: | (File handling, DMA)

Write a program that takes the name of a file that contains integers, reads the file into the dynamic array having size equal to the number of integers in the file. Write a function that accepts that integer array and should create a new array that is twice the size of the argument array. The function should copy the contents of the argument array to the new array, and initialize the unused elements of the second array with 0. The function should return a pointer.

Problem 4: | (Double pointers, DMA, Passing pointers as parameter, Returning pointers from function)

Write a C++ program to add 2 matrices A and B. Matrices should have user defined size. Use double pointers and dynamic memory allocation to create matrices. If both have equal size, then result of A+B should be saved in C matrix otherwise terminate the program. Write the following functions

• Void Input(int** p, int row, int col) // this function will input the p matrix

• Void Display(int** p, int row, int col) // this function will output the p matrix to console

• Int** Sum(int** p, int row, int col, int ** q , int row2, int col2) // this function will take sum of two matrices and return the resultant matrix.

• Print the resultant matrix in main using Display() function.

• Display A , B and C in matrix on console.

Example

A = 1 2

3 4

B = 6 5

7 1

C = 7 6

10 5

Problem 5: | : (Dynamic Memory Allocation)

Write a C++ program that will take input of 1D dynamic array named as Matrix. Now you will treat this array as 2D Matrix. User will input the size of array. Make sure it should be a square matrix otherwise take the input again.

Let's Say we have the following array of size=16 with row_size=column_size=4.

Matrix: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Its matrix representation will be

Matrix:

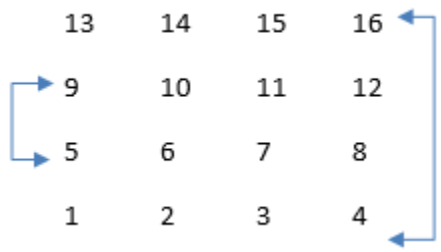
1 2 3 4

5 6 7 8

9 10 11 12

13 14 15 16

Now your task is to call a function SwapIt(Matrix) to swap its first row with last row, 2nd row with 2nd last row (and so on for matrix with greater size). After this function call DisplayMatrix().



Write your program for integer array named Matrix of size=16 with row_size=4 but your program should be generic enough that if user enter the size=25 with row_size=5 or any other size it should work fine. No other array should be used for this task. Your main should be in following flow.

Int* Matrix;

Input(int* Matrix, int size);

MatrixDisplay(int* Matrix, int size); // this function will display the Matrix array in matrix form

SwapIt(int* Matrix, int size); // this function will swap the rows

MatrixDisplay(int* Matrix, int size); // Now this function will display the Matrix array in matrix form with swapped row

Problem 6: (Double pointers, Dynamic Memory Allocation)

Write a C++ program to build a matrix that have different number of elements in each row (different number of column in each row) using two-dimensional dynamic array. For Example

```
Enter the number of rows=3
Enter the number of col in row 1 =3
Enter 3 elements in row 1 =1 2 3
Enter the number of col in row 2 =5
Enter 5 elements in row 2 =4 5 6 7 8
Enter the number of col in row 3 =2
Enter 2 elements in row 3 =1 2

Matrix is
1  2  3
4  5  6  7  8
1  2
```

Your program must contain two functions. One for filling the elements into your two dimensional array and other for printing that array or matrix.

Proper code indentation will hold extra marks !

Best of luck ☺

You are done with your exercise, submit on Teams at given time.