ENCE 3210 – Microprocessor Systems 1

Lab 1

January 9th, 2026

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1 – Write a program in C language such that:

a) It contains a function that calculates twice the square of a given integer;
b) Your program should calculate twice the square of numbers between 0 and 511 using your function. The results should be saved in an array

2 – Find the cosine of integer degrees between 0 and 360. The results should be saved in an array. Hint: The *cos()* function in *math.h* header file returns the cosine of a radian angle.

3 – You have to search for the second maximum of a given integer array with 50 elements. The array is saved as a global variable in the program. Write the results to the memory location just after the array ends.

4 – Write a C program to find the R, G, and B letters in an array. If the letters are detected, the red, green, and blue colors LEDs will turn on, respectively. Your program should count the number of occurrences of each letter in the array.

5 – Write a C program to detect a specified pattern with three entries in an array. The pattern is saved in another array. When the pattern is detected, the green color LED will turn on. If the pattern is not detected, the red color LED will turn on at the end of the program. Your program should count the number of occurrences of the pattern.

6 – We would like to turn on and off the red, green, and blue LEDs in a sequence. Therefore, write a C program with the following specifications:

a) When the button is pressed, turn on the red, green, and blue color LEDs with the following order: R – RG – RGB – GB – B – RB
b) This procedure is repeated until the button is pressed again.

7 – We would like to develop a simple calculator with the following specifications:

a) There will be three arrays each with 10 elements. The first two arrays will have integer numbers. The third array will be empty. We will apply arithmetic operations on the first two arrays.
b) When the button is pressed once, a counter will be incremented once. This will correspond to the addition operation. The red color LED will turn on.
c) When the button is pressed twice, the counter will be incremented twice. This will correspond to the subtraction operation. The green color LED will turn on.
d) When the button is pressed three times, the counter will be incremented thrice. This will correspond to the multiplication operation. The blue color LED will turn on.
e) When a second button is pressed, the selected operation will be applied on the two elements of the first and second arrays. The result will be saved in the third array and all LEDs will turn off. The operation will be applied to all remaining array elements. When all the results are saved, all LEDs will turn on.