

## LAB 3

# ARITHMETIC OPERATIONS

### OBJECTIVES:

- To code a program to add hex numbers.
- To code a program to add BCD numbers.
- To code a program to add two multi-byte BCD numbers.
- To examine the 8051 division and multiplication instructions.

### REFERENCE:

- Mazidi and McKinlay, “The 8051 Microcontroller and Embedded Systems”.

### MATERIALS:

- 8051 assembler and simulator.

### ACTIVITY 1

Write a program to add 10 bytes of data and store the result in registers R2 and R3. The bytes are stored in the RAM space starting at 40H. Use a simulator to single-step the program and examine the data.

; pick your own data. (Instructions: ADD, ADDC)

### ACTIVITY 2

Write a program to add 10 bytes of BCD data and store the result in R2 and R3. The bytes are stored in RAM space starting at 60H. Use a simulator to single-step the program and examine the data.

### ACTIVITY 3

Write a program to add two multi-byte BCD numbers together and store the result in RAM locations 40H - 44H. See the following example data. Use a simulator to single-step the program and examine the data.

DATA\_1:     98657654H

DATA\_2:     38775693H

### ACTIVITY 4

Write programs to multiply and divide two 8-bit numbers. Use MUL, DIV

## LAB 3 WORKSHEET

1. Explain the difference between the ADD and ADDC instructions.
2. Show how to perform the subtraction: 29H - 21H.
4. True or False. "DA A" must be used for adding BCD data only.
5. Can we use the "DA A" instruction to convert data such as 9CH into BCD without first performing an ADD instruction? Explain your answer.
6. Show a simple program to add 2345H and 56F8H.
7. Show a simple program to subtract 2345H from 56F8H.