

# CpE213 – TEST II, W02

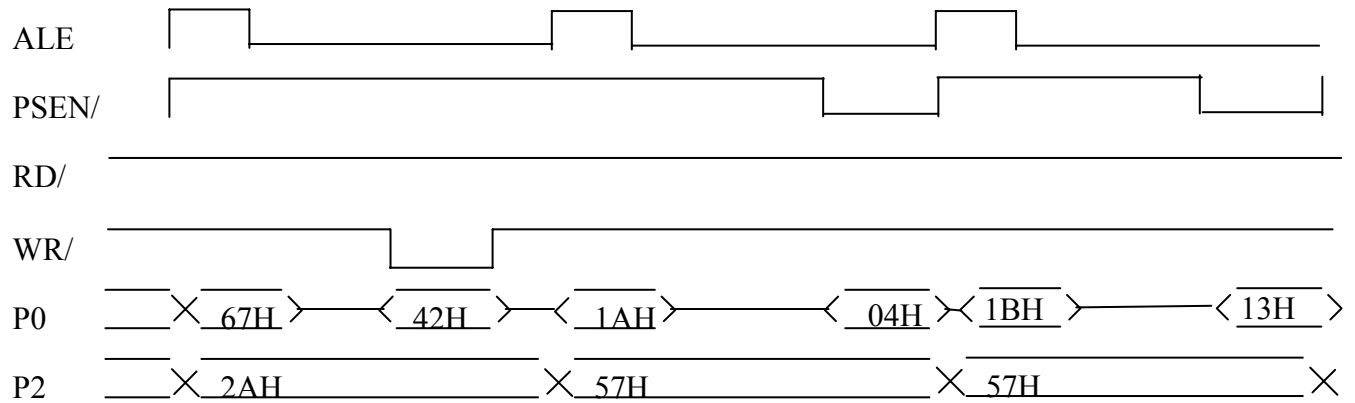
Name\_\_\_\_\_

Show all your work in the space provided. Answers with a simple “yes”, “no”, or a single number are typically incomplete and will not be given full credit. Answers in non-reduced form, like  $(a+\sqrt{b})/c$ , are fine where appropriate. Good English on essay/short answer questions is required. ON MULTIPLE CHOICE QUESTIONS, IF YOU’RE NOT SURE GUESS CAREFULLY– you will get points off for wrong answers. If you know part of an answer, write what you know for partial credit.

1. (15 Points) A function written in C was compiled to the ASM code shown below. Write the C-code for that function. The function must have the correct input and return parameters and those parameters must be of the correct type. Assume that the C-compiler appends a “\_” to the function name in the assembly language translation (e.g. function “blah” translates to “\_blah” in ASM). You will not get *full* credit if your C-code mentions the ACC or the registers directly! (e.g. ACC = R2).

```
myfunction segment code
rseg myfunction
_stuff: MOV A,R2
        ADD A,R0
        MOV R0,A
        MOV A,R3
        ADDC A,R1
        MOV R1,A
        RET
```

2. (18 Points) For the following waveform:



a. What instruction was read and executed from code memory (if multiple instructions, answer for all)?

- |               |                   |                      |
|---------------|-------------------|----------------------|
| a) XRL A, @R1 | b) ORL 04H, A     | c) ADD A, R2         |
| d) ANL A, @R1 | e) DEC R2         | f) INC A             |
| g) RRC A      | h) No way to tell | i) None of the above |

b. What is the address of the instruction read and executed (if multiple instructions, answer for all)?

- |          |          |                   |                      |
|----------|----------|-------------------|----------------------|
| a) 67H   | b) 1AH   | c) 04H            | d) 2A67H             |
| e) 571AH | f) 571BH | g) 1A57H          | h) 1B57H             |
| i) 13H   | j) 57H   | k) No way to tell | l) None of the above |

c. If a dummy fetch occurred, where did it take place?

- |                  |  |                                   |                                 |
|------------------|--|-----------------------------------|---------------------------------|
| a) None occurred | b) 1 <sup>st</sup> 3 <sup>rd</sup> of the plot | c) middle 3 <sup>rd</sup> of plot | d) last 3 <sup>rd</sup> of plot |
|------------------|--|-----------------------------------|---------------------------------|

d. Was a value read or written to data memory?

- |                     |                          |              |               |
|---------------------|--------------------------|--------------|---------------|
| a) No read or write | b) both a read and write | c) read only | d) write only |
|---------------------|--------------------------|--------------|---------------|

If you answered that data was read or written, please answer questions e and f as well:

e. What value was read or written to data memory (if multiple values, answer for all)?

- |        |                   |                      |
|--------|-------------------|----------------------|
| a) 67H | b) 42H            | c) 1AH               |
| d) 04H | e) 1BH            | f) 13H               |
| g) 2AH | h) No way to tell | i) None of the above |

f. What is the address in data memory that was accessed (if multiple values, answer for all)?

- |          |          |                   |                      |
|----------|----------|-------------------|----------------------|
| a) 67H   | b) 1AH   | c) 04H            | d) 2A67H             |
| e) 571AH | f) 571BH | g) 1A57H          | h) 1B57H             |
| i) 13H   | j) 57H   | k) No way to tell | l) None of the above |

3. (20 Points) C-programming for the 8051.
- a. Write a statement (or statements) in C to create an integer variable x located at address 142AH in external data memory. Indicate if x must be declared globally or can be declared locally.
  
  
  
  
  
  
  
  
  
  
  - b. Write a short section of code in C to set (only) bit 7 of port 2. If you declare variables, indicate if they are global or local.
4. (10 Points) Say you are reading a number from an external sensor and that number could be treated as a float (e.g. could be read as 42.1, 42.3, 42.3, etc). When writing a program in C for the 8051, would you be better off going to the trouble of converting that number to an integer or char before adding/multiplying/dividing it or should you just use it directly as a float? Justify your answer.

5. (22 Points) Write a program in ASM which performs the same basic operations as the following program in C. Your ASM program should be complete with segment and variable declarations, EQU statements, and the like. If you can not do the entire program, show ASM instructions for each line of C code (e.g. for “unsigned char i”, “x = x<<1”, etc)

```
/* C-code to do stuff */

void main(void){
    unsigned int x;
    unsigned char i;

    while(1){
        x = (P1<<8)|P0;

        x = x<<1;

        for (i=42;i!=0;i--)(;)
    }
}
```

6. (15 Points) If your program above had included a call to a function blah (i.e. included the statement “blah();”), what very important ASM code would you have to include at the beginning of your program? (i.e. what code do you ALWAYS have to include when your program has a function call)? Write this code and explain why it’s needed.