

**Hour Exam 1 8051 Architecture**

1. Why are there no formal I/O instructions in the 8051 assembly language?
2. In the short instruction sequence below, what is the instruction executed *after* the  
jz Target instruction.

```
    mov r0, #1
    mov A, #2
    dec r0
    jz Target
    mov A, #3
Target:mov r0, #7
```

3. The 8051 family has four register banks where each bank consists of 8 registers referred to as R0 to R7. What is the advantage of having four register banks as opposed to 32 registers?
4. Find the execution time of the following sequence. Assume the code is running on an Atmel AT89C51AC3 with a 29.4MHz crystal and is double clocked. Show all work.  
 mov a, #60h  
Loop: dec a  
 cjne a, #56h, Loop

5. Write a logical instruction sequence which does the same thing as the following bit instructions:  
 setb c  
 mov P1.5, c

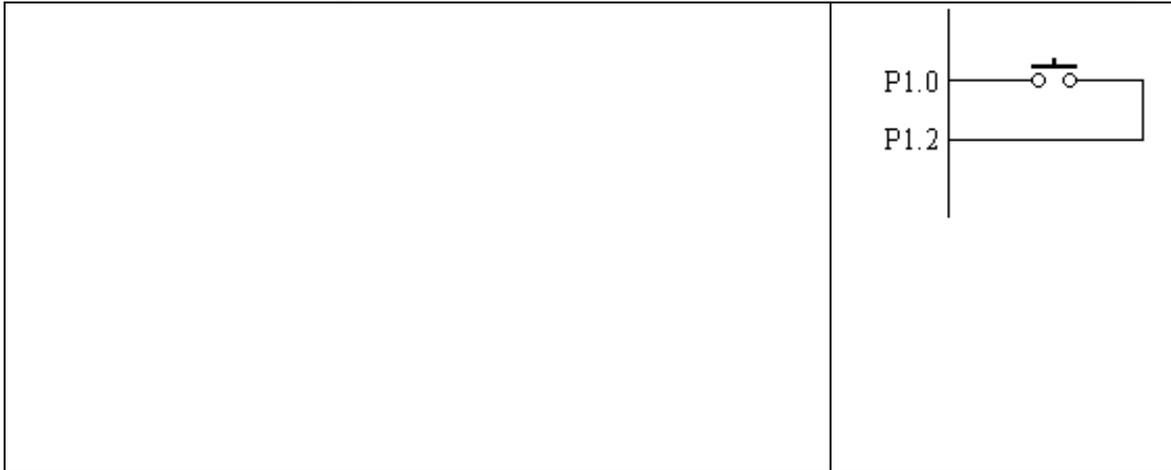
6. Write a single assembly language instruction that copies the bit at 95H in internal memory to the carry flag.

**Hour Exam 2**

1. Explain the difference between the following two declarations in C:  
 char code myChar[] = "abcdef";  
 char myChar[] = "abcdef";
2. If the 8051 is running with a 29.4 MHz clock, calculate the number to be loaded into timer 0 to produce interrupts every 5 msec.
3. Write a statement in C to make external interrupt 0 edge sensitive.
4. Suppose an interrupt is level sensitive rather than edge sensitive on the 8051. What things must be done differently in the interrupt service routine?



9. Write a C language program for the 8031 processor which will test the switch in the figure below and call a function called *CLOSED()* if the switch is closed and will call a function called *OPEN()* if the switch is open.



### Quiz 1 – ARM processor

1. Explain the difference between ARM code, Thumb code, and Thumb2 code?
2. What does the assembly instruction `mov r15, r14` do (other than the obvious)?
3. When combining an assembly module with a C module how are parameters passed?
4. How is the THUMB register set different from the ARM register set? Why is it necessary to have two different register sets.

### Hour Exam 3 – ARM Processor

1. Suppose that the baud rate divisor is `0x682`. If the peripheral clock runs at 16 MHz, what is the actual baud rate? Show your work.
2. If the peripheral clock runs at 16 MHz what is the time delay on Timer 3 if we load its auto-reload-register and prescale register using the following: Show your work.  
`TIM3_PSC = 6;`  
`TIM3_ARR = 2500;`
3. A function prototype is given below. Write a sample calling statement that could go into a main program to activate this function.  
`float MyFunction(int d[], char sz, int *p);`

4. Write a function called `SwapIfBigger` which accepts two parameters and swaps the two parameters if the first is larger than the second. Otherwise it does nothing.  
Give an example of how your function would be activated in a main program.

**Here are some additional items you should understand.**

### **8051**

1. Be able to write short pieces of C code for the 8051 that do bit manipulation, I/O to ports, and/or manipulation of memory variables.
2. You should understand the real time clock routine given in class and posted on the web site.
3. There will be short answer questions that are directly related to your Simon Says project.
4. You should be able to change a short sequence in assembly language to C code and vice-versa.

### **ARM**

1. Understand the architecture and be able to answer short questions about memory organization, word and instruction length, the phase locked loop unit, and the interrupt system.
2. There will be some short answer questions which contrast the 8051 and the ARM Cortex M4.