EE 371 Last Semester Test - Friday December 6, 2002

45 points, 15% of Final Grade

Please put your name on the outside of the paper also Name _____KEY_____

1. Why is the RS232 voltage specification for mark and space logic levels used for serial communications instead of TTL voltage levels? (2 points)
   To gain increased noise margin.

A serial I/O port sends the following **waveform**:

Mark

Space

2. What is the ASCII character being sent? (2 points) . . . . . **__a_____**

3. What type of parity is being used? (2 points) . . . . . **_Odd_____**

4. An A/D converter is required to digitize a 5 KHz sinusoidal waveform. What is the maximum allowable conversion time for the A/D? (Assume a sample-and-hold circuit is being used.) (2 points)
   0.1 ms

5. An A/D converter is required to digitize a -5 to +5 volt analog signal to a resolution of 10 mV. How many bits are required? (2 points)
   10 bits

Each of the following multiple choice and T/F questions are worth 2 points.

6. What HC12 addressing mode is best to use when you want to access a number of sequential elements in a data array?
   A. Immediate B. Direct C. Extended D. Indexed E. None of these
   Indexed
7. What HC12 addressing mode is best to use when you want to compare what is in accumulator A with a constant?
   A. Immediate B. Direct C. Extended D. Indexed E. None of these
   Immediate
8. How may one specify an 8-bit operand when using the CASM12 assembler?
   A. In hexadecimal B. In decimal C. In binary D. All of these E. None of these
   All of these

Answer the following True (T) or False (F). In the HC12, . . .

9. Interrupts are masked when you get to the interrupt service routine. . . . . **T**
10. The stack may be located in the EEPROM memory. . . . . F
11. You may use extended addressing to store data in ROM. . . . . F
12. You may use direct addressing to store data in RAM. . . . . T

Answer questions 13 - 15 assuming that in the HC12, A=$83, B=$29 and the ABA instruction is executed.

13. What is in the condition code register bits? (2 points)
N = __1___ Z = __0___ V = __0___ C = __0___

14. If the result represents information encoded in two's-complement code, what is the decimal equivalent of the result? (2 points)
84

15. If the result represents information encoded in unsigned binary code, what is the decimal equivalent of the result? (2 points)
172

16. Give three rules that must be followed when writing ISRs. (3 points)
See page 19, the Red Book

17. What is an advantage that polled interrupts have over vectored interrupts? (2 points)
Simpler CPU hardware; software prioritzation

18. What is an advantage that vectored interrupts have over polled interrupts? (2 points)
Faster (lower latency);

19. Design a simple input interface that would allow data to be input from a set of switches to an 8-bit data bus. Assume the processor has a 16-bit address bus. Show the interface and show how you would connect the switches. (4 points)

20. In a parallel output operation, how is the data transfer between the CPU and the output latches synchronized? (2 points)
An address decoder is used to select the device and the WRITE control signal is asserted whtn the data has been placed onto the data bus by the CPU.

21. Draw a timing diagram which includes the system clock, the address and data buses and the read control signal (RD* = active low) which show a read cycle. (2 points)