CSC 230: COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE

Instructor: Watheq El-Kharashi

Midterm **Fall 2000**

Student Name:..... ……..

Registration Number: ..... Lab Section: LF .....

This is a closed book exam. ..... Time: 50 minutes ..... Total: 40 marks

---

1) [**5 Marks**] State whether each of the following statements is true or false:

- The 8-bit two's complement representation of -15_{10} is 11110001_2.
- 2's complement representation has different representations for +0 and –0.
- The single precision IEEE floating point standard format has different representations for +0 and –0.
- In 2's complement addition, overflow can only occur when adding two negative numbers.
- Single bit parity allows for the detection and correction of single bit errors.

---

2) **[4 Marks]** For the single precision IEEE floating point representation for 13.5_{10}

- What is the value of the sign bit: ____
- What is the actual value stored for the exponent (in decimal): _____
- What is the actual value stored for the mantissa (in binary):_____

  (ignore trailing zeros)
- What is the complete 32 bit representation (in hex) of the number:_____

---

3) **[3 Marks]** How many fetch operations does the 6811 have to perform as it executes each of the following instructions?

- LDAA # $24 _____
- LDAA $24 _____
- LDAA $24, X _____

4) **[10 Marks]** Consider the following program:

```
P    EQU  6
Q    RMB  1
     ORG  $C000
MAIN LDAA #P
     LDAB #1
LOOP TSTA
     BEQ  DONE
     ASLB      ; ARITHEMTIC SHIFT LEFT OF ACC B
     DECA
     BRA  LOOP
DONE STAB Q
     STOP
     END
```

a) **[1 Mark]** Circle the correct value that is stored in Q upon reaching the STOP instruction.

$Q = 10^6$ $Q = 2^6$ $Q = 10^{-6}$ $Q = 2^{-6}$ 2*6

b) **[6 Marks]** Show the listing file (.lst) generated by the assembler

c) **[3 Marks]** Show the symbol table generated by the assembler for this program.

5) **[10 Marks]** Perform each of the following operations using 8 bit 2's complement numbers and show the condition code flag settings that will result. As shown all operations are to be done as additions.

Decimal	**Answer** (show all values in binary)	**C**	**V**	**N**	**Z**
11 – 11	_____ + _____ = _____				
-127 - 1	_____ + _____ = _____				

6) **[8 Marks]** Write a complete 6811 assembly language program that sums the even integers from 2 to 26 inclusive leaving the sum in ACCA upon completion of the program.

End of Midterm