

## ENS1161 Computer Fundamentals

### Module 4 – Revision Questions

1. Briefly describe the main function of the ALU and how it carries out those functions.
2. What are flags? Where and how are they stored?
3. Briefly explain the function of the following flags and how the ALU works out their value:
  - a. C flag
  - b. N flag
  - c. V flag
  - d. Z flag
4. Binary numbers stored in a computer can be interpreted as either signed or unsigned numbers. Interpret each of the following binary numbers as (i) unsigned integers and (ii) signed 2's complement integers
  - a. 0101 1100
  - b. 1100 1010
5. Given that the two binary numbers in question 4 above are added by an 8-bit ALU:
  - a. Work out what the 8-bit result would be and what the value of the C, N, V and Z flags would be.
  - b. Interpret the result as (i) an unsigned integer and (ii) a signed integer
  - c. Do the answers to part b. make sense? If not, what should be done to the results so that the answers are 'correct'?
  - d. How would the processor know whether needs to do what was described in part c. or not?
6. Briefly explain why the multiplication function in an ALU would require a 16-bit register to store the result of two 8-bit numbers.
7. Explain what AND-masking and OR-masking are and how this is applied.
8. Assume that the AL register contains the bit string **0010 1010**. What value would this represent if interpreted as an unsigned integer?  
Now work out the contents of AL and the unsigned integer value of the contents if the following operations were carried out on AL with the contents above:
  - a. One SHL
  - b. One SHR
  - c. Two SHR

9. Assume that the AL register contains the bit string **1110 1000**. Work out:
- The value of the contents of AL if interpreted as a signed integer
  - The contents of AL after two SAR operations
  - The value of the result in (b) interpreted as a signed integer
10. \*\* The instruction **JLE** stands for *Jump if Less than or Equal to*. Based on that description, what flags do you think would be checked and what combination of flags would make the processor carry out the Jump?
- \*\* *Note*: Requires some thinking / research.