Name: KEY **Id#**

COE 301/ICS 233, Term 151

Computer Architecture & Assembly Language

Quiz# 1

Date: Sunday, Sep. 6, 2015

Q1. Fill the blanks in the following questions:

1. Assuming **5-bit 2`s complement** representation, the smallest (negative) number is <u>10000</u> in binary and <u>-16</u> in decimal and the largest (positive) number is <u>01111</u> in binary and <u>+15</u> in decimal**.**

2. Consider an **8-bit** register that has the binary number 11010100. The decimal value of this number as a signed number in sign-magnitude representation is <u>-84</u> while in 1's complement representation it is <u>-43</u> and in 2's complement representation it is <u>-44</u>.

3. Assuming **8-bit 2`s complement** representation, the hexadecimal number F4 represents the decimal number <u>-12</u>.

4. The binary number 11000100 represents character '<u>D</u>', and uses an <u>odd</u> parity bit. Note that the ASCII code of character **A** is 41H and that of character **a** is 61H.

5. The need for a memory hierarchy is due to <u>widening speed gap between CPU and main memory and also due to performance/cost tradeoff.</u>

6. <u>The instruction Pointer (IP)</u> is a register that holds the address of the next instruction to be fetched from memory.

7. <u>The instruction set architecture (ISA)</u> is considered as an interface between software and hardware and consists of <u>the instruction set</u>, <u>programmer accessible registers</u> and <u>memory</u>.

8. Given a magnetic disk with the following properties:

   - Rotation speed = 7200 RPM (rotations per minute)
   - Average seek = 8 ms, Sector = 512 bytes, Track = 200 sectors

   The average time to access a block of 100 consecutive sectors is <u>16.33</u> ms.

   Average access time = Seek Time + Rotation Latency + Transfer Time
   Rotation time in milliseconds = 1000*60/7200 = 8.33 ms
   Rotation Latency = 8.33/2 = 4.167 ms
   Time to transfer 100 sectors = (100/200)* 8.33 = 4.167 ms
   Average access time = 8 + 4.167 + 4.167 = 16.33 ms.

9. Two main advantages of programming in high-level language are: <u>program development is faster</u> and <u>programs are portable.</u>

10. Two main advantages of programming in assembly language are: <u>space and time efficiency</u> and <u>accessibility to system hardware.</u>