**Name: KEY** **Id#**

# ICS 233, Term 081

## Computer Architecture & Assembly Language

### Quiz# 1

Date: Saturday, Oct. 25, 2008

**Q1.** What is assembly language?

Assembly language is the set of instructions that can be executed by a processor expressed in symbolic form.

**Q2.** List three advantages of programming in assembly language and three advantages for programming in high level language.

Advantages of programming in high-level language are: program development is faster, program maintenance is easier and programs are portable.

Advantages of programming in assembly language are: accessibility to system hardware and space and time efficiency.

**Q3.** Describe the difference between volatile and non-volatile memory and give an example of each.

In volatile memory devices, data is lost when device is powered off while non-volatile memory devices stores information permanently. Example of volatile memory is RAM and example of non-volatile memory is ROM.

**Q4.** Describe how the disk access time is computed.

Disk Access Time = Seek Time + Rotation Latency + Transfer Time
Seek time is the time for the head to move to the track which has the data stored. Rotation latency is the average time for finding the required sector in the track. To find this, we compute it as half the time for the disk to make one complete rotation. The data transfer time is the time to read the data from the sectors which is also related to the rotation time.

**Q5.** Explain why the memory system is deigned in a hierarchical manner. Describe how the memory system is designed in a hierarchical manner.

Due to the widening speed gap between CPU and main memory, main memory became a bottleneck in computer system performance since each instruction requires at least one memory access for reading the instruction and possible another for reading or storing data into memory.

The memory hierarchy is designed in such a way that memory elements in the top of the hierarchy are the fastest and smallest in size. Then speed decreases and size increases as we go down the hierarchy. Memory hierarchy is organized as follow: Registers, Level 1 Cache, Level 2 Cache, Main Memory, Disk Storage and Tape.

**Q6.** Briefly describe the main functionality of the program counter register (PC), the instruction register (IR), and the fetch-execute process in a computer.

Program counter register: is the register in the CPU that holds the address for the next instructor to be fetched from memory.

Instruction register: is the register in the CPU that stores the machine language instructions, temporarily, after the instructions are fetched from memory.

Fetch-execute process: In the fetch-execute process, the CPU takes the address stored in the program counter and reads from memory the instruction stored at that address. The instruction read from memory is stored in the instruction register. The program counter is then incremented to point to the next instruction to be fetched from memory. Then, the CPU executes the instruction stored in the instruction register. Execution of the instruction includes decoding the instruction, getting the operands, performing the instruction operation and storing the result back. The process is performed repeatedly until the machine is halted.

**Q7.** What is the instruction set architecture of a processor?

The instruction set architecture is considered as an interface between software and hardware and consists of instruction set, programmer accessible registers and main memory.