**Md Towhedur Rahman-u2151946**

**Week 3 – CPU and Memory**

**Practice Questions**

Please read the relevant chapters of the essential textbook by Englander before answering these questions.

1. The Little Man Computer (LMC) is a simple model that is used to simulate the operation of a computer.

Summarise the purpose of each of the following key components of the Little Man Computer.

* 1. **Mailboxes**:
  2. **Calculator:**
  3. **Instruction location counter:**
  4. **The little man:**
  5. **In and out baskets:**

1. Summarise the following LMC instructions:
   1. 000- Halt Cob/ coffee break/
   2. 1xx- Add
   3. 2xx- Sub
   4. 3xx- Store
   5. 5xx- Load
   6. 901-Input
   7. 902-Output
2. Fill in the blanks

|  |  |
| --- | --- |
| **Component of CPU** | **Corresponding component of LMC** |
| Arithmetic and logic unit (ALU) | calculator |
| Control unit (CU) | Little Man |
| Program counter (PC) | Instruction Location counter |
| I/O interface | In and out baskets |

1. What is held in each of the following registers?
   1. **Instruction register (IR):** Stores instruction fetched from memory.
   2. **Memory address register (MAR**): memory address register holds the address of the current instruction that is to be fetched from memory.
   3. **Memory data register (MDR):** Memory data register holds the contents found at the address held inthe MAR.
   4. **Status registers:** It is a hardware register that contains information about the state of the processor.
2. What is meant by volatile and non-volatile memory? Give an example of each.

Volatile Memory: Volatile memory is a type of storage whose contents are erased when the systems power is turned off or interrupted.

RAM is a volatile because when you work on a document it is kept in RAM and if your computer loses power then your work is lost as well.

Non-Volatile Memory: A type of computer memory that can retrieve stored information even after having been powered cycled.

Examples are- Hard disk drive-HDD, Solid state drive-SDD, Flash drive-USB

1. Distinguish between the following types of memory:
   1. DRAM-Dynamic RAM

DRAM is one of the most commonly found RAM modules in PC compatible personal computers and workstations. It stores its information in a cell containing a capacitor and transistor.

* 1. SRAM-Static RAM

SRAM is the faster and expensive random-access memory (RAM) that is volatile and uses latching circuitry to store each bit and data is lost when power is removed.

* 1. EEPROM-Electrically Erasable Programmable ROM

It is an operator which allows to use the EEPROM just like an array which is non-volatile memory used for computer systems, smart cards.

* 1. Flash memory: It is designed

1. List the main components of a CPU and describe the function of each component.

Main component of a CPU:

ALU-Arithmetic Logic Unit: Performs calculation and comparisons.

CU-Control Unit- Performs fetch/execute cycle

Functions:

• Moves data to and from CPU registers and other hardware components

• Accesses program instructions and issues commands to the AL

Memory management unit:

Supervises fetching instructions and data

I/O Interface:

sometimes combined with memory management unit as Bus Interface Unit