

Department of Electrical Engineering, IIT Bombay
**EE309 Computer Organization, Architecture and
Microprocessors: Tutorial Sheet I**
Basic Computer Organization

General Outline

- Components of a Basic Computer - Computational Unit, Storage. Registers and Memory
- What does the instruction set of a machine depend on ?
- The Control Unit, ALU, I/O, and registers
- The Stack
- Instruction Formats
- Addressing Modes
- Memory Organization. Virtual Memory
- Interrupts, I/O: Peripheral-mapped / Isolated I/O, and Memory-mapped I/O. Polling, Interrupts, DMA

Questions

Short answers only: no stories, please !

1. When a subroutine is executed, why is the address of the next instruction typically saved on the stack, rather than in registers ?
2. Briefly compare Isolated (Peripheral-Mapped) I/O with Memory-Mapped I/O.
3. Account for the relative speed difference while transferring large quantities of data, using the three I/O methods - Programmed I/O (Polling), Interrupt-Initiated I/O, and Direct Memory Access (DMA)
4. What is microprogrammed control ? What is the advantage of using microprogrammed control ?
5. What are the main characteristics of RISC instructions ?

6. Explain (in not more than a few lines each), what each of the following addressing modes are:
 1. Implied Mode
 2. Immediate Mode
 3. Register Mode
 4. Register Indirect Mode
 5. Autoincrement / Autodecrement Mode
 6. Direct Address Mode
 7. Indirect Address Mode
 8. Relative Address Mode
 9. Indexed Addressing Mode
 10. Base Register Addressing Mode

7. In Virtual Memory organizations, explain the advantages and disadvantages of the following three ideas for the mapping table. Assume a 32-bit address bus and a 32-bit data bus, and 512 MB, and 'enough' disk space to be present.
 - (a) One entry per memory address
 - (b) One entry per {the number of chunks of the main memory that can fit in the virtual memory }
 - (c) Dividing Main Memory into 4 blocks, and Virtual Memory into the requisite number of pages