

ECE 2030: Terms

After covering each module you should know what the corresponding terms mean.

1. Computing Systems

- Binary, Octal, Hexadecimal, Decimal notation
- Moore's Law

2. Switch Design

- CMOS, p-type (pfet) transistor, n-type(pfet) transistor, n-type switches, p-type switches
- Shorts, floats, high impedance
- Pull-up and pull-down networks, dual network, truth table
- AND, OR, INVERT, NAND, NOR, EX-OR, EXNOR, T-GATES, pass gates
- RC time constant, rise time, fall time, standard load, propagation delay, fan-in, fan-out.

3. Boolean Logic

- Boolean literal, expression, function
- Algebraic simplification
- Universal gates
- Sum-of-minterms, product-of-maxterms, sum-of-products, product of sums
- Dual, complement and inverse of a Boolean function
- DeMorgan's Law, operator precedence
- Propagation delay and critical path in a combinational circuit

4. Gate Design

- Inverting and non-inverting gates, negative and positive logic, active low and active high signals
- Mixed logic gate, mixed logic notation
- DeMorgan equivalent gates
- Combinational logic

5. Simplifying Expressions

- Karnaugh maps, don't care symbols, implicant, prime implicant, essential prime implicant

6. Building Blocks

- Encoder, decoder, priority encoder, multiplexor, demultiplexor, combinational logic
- Programmable logic device, fuse, antifuse

- ROM, Programmable Logic Array (PLA), Programmable Array Logic (PAL). FPGA

7. Number Systems

- Fixed point, floating point, range, precision, accuracy, error, single precision, double precision
- Signed integer, unsigned integer, one's complement, two's complement, r's complement, sign magnitude
- Notation, representation

- Bit, byte, word, ASCII

8. Arithmetic

- Addition/subtraction, multiplication, and overflow
- Half adder, full adder, subtractor, ripple carry, carry look-ahead

9. Latches and Registers

- Transparent latch, D-Latch, SR Latch, S'R' Latch, flip flop, JK flip flop, register cell, timing diagrams
- Control: read enable, write enable, two-phase non-overlapping clocks, edge triggered design
- Multi-bit register, shift register, parallel load, serial load, initialize register
- Left shift, right shift, rotate, logical shift, arithmetic shift
- Asynchronous and synchronous reset
- Load, store, read, write, clear, initialize

10. Counters

- Toggle cell, counter, modulo-k counter, up counter, down counter
- Cascaded counters, count-by-k counter

11. State Machines

- State machine, state diagram, state transition table, states, undefined states, state encoding, state machine initialization
- Next state function, output functions, state elements
- Moore machine, Mealy machine
- Synchronous vs. asynchronous state machines

12. Memory

- Static Random Access Memory (SRAM), Dynamic Random Access Memory (DRAM), word line, bit line
- RAS, CAS, buffer, data bus, address decoding, row and column addresses

- Understand memory cell behavior and how it is different from a register cell.
- Memory chips, addresses, byte, half word, word addresses, 2^k byte address boundaries, alignment
- Memory directives : .data, .word, .byte, .asciiz, .ascii
- Little endian, big endian

13. Datapath Units

- Register file, shifter, Arithmetic Logic Unit (ALU), shifter, barrel shifter
- Logical, arithmetic, rotate shift operations
- Buses, datapaths, immediate values

14. Controllers & Instructions

- Program counter, controller, microcode, sequencer, microprogram, microprogram counter, instruction, instruction decode, instruction set architecture
- Opcode, operand, register operand, immediate operand, single cycle datapath
- MIPS ISA

15. Branching and Procedures

- Branches, conditional branches, unconditional branches, if-then-else, for loop, while loop, forward and backward branches, branch range,
- stack, stack frame, push, pop, assembly language, absolute vs. relative addresses