

Principal Areas for Final Exam Questions

1. Binary number representation, including:
 - (a) “Unsigned”, or Non-Explicitly-Signed Numbers
 - (b) Ones’-Complement
 - (c) Two’s-Complement
 - (d) Signed-Magnitude
 - (e) Biased, or Excess- N Representation (N is usually, but not necessarily, $2^n - 1$)
 - (f) Floating-Point (Dr. Adams’ section only)

(g) Under what circumstances, or to represent what, is each of these representations used in a digital computer?

(h) Number of possible values, smallest (i.e., most negative) value representable, and largest value representable, according to each representation scheme, for n bits.
2. Fixed-Point or Integer Arithmetic, and the four principal status bits: Z,N,V,C
 - (a) “Unsigned”, or Non-Explicitly-Signed Numbers
 - (b) Ones’-Complement (Dr. Adams’ section only)
 - (c) Two’s-Complement
 - (d) Saturation Arithmetic (Dr. Abzug’s sections only). See the “Review Questions on Digital Integer Arithmetic” posted on the course web page.
3. Understanding Microcode:
 - (a) The Fetch-Decode-Execute Cycle
 - (b) Register-Transfer Language (RTL)
 - (c) Where and how do Interrupts come into play within the Fetch-Decode-Execute Cycle?
 - (d) The details of the Fetch portion of the cycle (identical for all machine instructions)
 - (e) How does the decode part of the cycle work?
 - (f) The Execute part of the Fetch-Decode-Execute cycle, for each machine instruction
 - (g) Be able to recognize which machine instruction is being implemented, given the microcode for the execution portion of the cycle.
 - (h) Be able to write microcode to implement either the fetch part of the cycle, or the execution part of the cycle for any machine instruction.
 - (i) Be able to trace the passage of data through the various registers of the machine as the various lines of microcode are executed.
4. For Dr. Abzug’s sections, there will also be several questions covering some of the student term projects that were presented in the last two days of class.
5. Of course, the Final Examination is cumulative. Therefore, it is important that you also review all the material covered for the mid-term examination. This includes, for Dr. Adams’ section, (i) Combinational Circuits; (ii) Sequential Circuits; (iii) Flip-Flops; (iv) State Diagrams, (v) Boolean operations, and (vi) the various diagrams from the textbook in the chapters covered. For Dr. Abzug’s sections, be sure to review Quizzes 1-6, which served as the major basis for the mid-term, as well as quizzes 7-8, whose material was covered since the mid-term.

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