PhD QUALIFYING EXAM STUDY GUIDE
Microprocessor Applications

Topics and Subtopics
• Basic concepts in microprocessor architecture, systems, operation, and application
• Programming model and addressing modes
• Assembly-language programming
• Program structures and software design concepts
• Microprocessor buses, interfacing, and electrical parameters
• Address decoding and system timing
• Interrupts, interrupt service routines, and direct-memory access
• Memory concepts and interfacing
• Parallel, serial, and analog I/O and interfacing
• Timers and timer operations

Suggested Reference Materials

Suggested Reference Courses
• EEL 4744C - Microprocessor Applications

Sample Questions
• Given the specifications for an 8-bit microprocessor and a set of SRAM memory devices, show how to design a 32KB memory subsystem to start at address $8000. Evaluate and where possible address any issues of timing, fan-out, and noise immunity in this design. Next, using basic logic gates, show how to design a bus interface for a bank of 8 simple switches at address $4000 and another interface for a bank of 8 LEDs at address $4800. For all cases, include decoding circuits. Also include a single memory map for your system.
• Given the specifications for the instruction set and addressing modes of a generic microprocessor, design the assembly language software (with comments) for three functions to find and return the maximum, minimum, and average values from a list of A/D sensor values (8-bit unsigned integers) of length up to 64K starting at some arbitrary address. Then, design the main program to call these three functions for a list of 100 sensor values starting in memory at address $8000 and store the results to memory immediately following the list.
• End-of-the-chapter ( chapters 1-8) problems in the suggested reference materials.