Subject: **Computer Architecture and Organization**

Summary: This exam evaluates the student's undergraduate and junior graduate understanding of the area of Computer Architecture and Organization and its related subject areas. The specific subjects to be addressed are provided as keywords below. Beyond these basic subjects, you should be comfortable with logic circuit design (combinational and sequential), and microprocessor systems.

Keywords

- The Evolution of Computers and the Von Neumann Architecture.
- Central Processing Unit Organization and Instruction Formats.
- Arithmetic Logic Unit (ALU) Operation and Design; Fixed and Floating-Point ALUs.
- Control Unit Design: Hardwired and Microprogrammed Control Units.
- Reduced and Complex Instruction Set Computers (RISC and CISC).
- Memory Organization: Characteristics, Hierarchical Structures, Virtual Memories, Cache, and Interleaved Memories.
- Input Output Organization: Interrupt, Direct Memory Access (DMA), and Input-Output Processors.
- Parallel Organization: SIMD, MISD, MIMD, Multiprocessor Systems, vector and array processors, Scalable and Superscalar Architectures, and Supercomputers.
- Fault-Tolerant Computers: Static Redundancy (e.g., Triple Modular Redundancy TMR), Dynamic Redundancy, Availability, Mean Time To Failure (MTTF).
- General Purpose Microprocessors (Intel and Motorola).
- Digital Signal Processing Architectures (Texas Instruments, Analog Devices Inc., Motorola): Hardware Structure, Software Features, and Multiprocessor Systems.
- Embedded Computer Systems.