

國立臺灣科技大學

八十九學年度碩士班招生考試試題

系所組別：電機工程系丙組

科目：計算機組織

1. When people speak about inaccuracy in floating-point arithmetic, they often ascribe errors to cancellation that occurs during the subtraction of nearly equal quantities. But when X and Y are approximately equal, the difference $X-Y$ is obtained exactly, with no error. What do these people really mean? (15%)
2. Assume an instruction set that uses a fixed 16-bit instruction length. Operand specifiers are 6 bits in length. There are K two-operand instructions and L zero-operand instructions. What is the maximum number of one-operand instructions that can be supported? (15%)
3. Design a computer memory system with a function of memory error detection. (20%)
4. A data source produces 7-bit ASCII characters, to each of which is appended a parity bit. Derive an expression for the maximum effective data rate (rate of ASCII data bits) over an R-bps line for the following:
 - (a) Asynchronous transmission, with a 1-unit start bit and a 1-unit stop bit. (7%)
 - (b) Bit-synchronous transmission, with a frame consisting of 24 control bits and 64 information bits. (8%)
5. The following sequence of virtual page numbers is encountered in the course of execution on a computer with virtual memory:
3, 2, 4, 6, 4, 7, 2, 1, 3, 6, 5, 3, 2, 3, 1
Assume that a least-recently-used page replacement policy is adopted. Compute the page-hit ratios (fraction of page references in which the page is in main memory) for the two main-memory page capacities 4 and 6, respectively. Assume that main memory is initially empty. (15%)
6. A set associative cache consists of 256 lines, or slots, divided into 8-slot sets. Main memory contains 16K blocks of 4 words each. Show the format of main memory addresses. (10%)
7. List the drawbacks of interrupt-driven I/O as compared to DMA. (10%)

