

國立臺灣科技大學

九十二學年度博士班招生考試試題

系所組別：電機工程系博士班丙組

科目：計算機系統

總分 100 分

1. Explain the following terminologies: (12%)
 - (a) Memory Interleaving
 - (b) PLA
 - (c) CISC vs. RISC
 - (d) volatile

2. What are the three mapping categories of cache organization? Please illustrate and explain them. (8%)

3. For a Carry Look-Ahead adder (CLA adder)
 - (a) What is the internal logic of a 4-bit CLA adder? (5%)
 - (b) How to make a 16-bit CLA adder based on the 4-bit CLA adder? (5%)

4. The SEAS 16-bit floating point standard is just like the "IEEE floating point standard" except that it uses 1 bit for the sign, 5 bit for the exponent, and 10 bits for the fraction (or mantissa). The exponent is in excess 15 representation. (10%)
 - (a) What is the decimal representation of the following SEAS floating point number?
0 01001 0101000000
 - (b) What is the "SEAS standard 16-bit" representation of the decimal number -50.75 ?

5. How to design a 512 M × 32 bits RAM with the 4M × 4 bits RAM ICs ? A decoder is provided. The chip select is played by the address strobe lines \overline{RAS} and \overline{CAS} (Row & column address) simultaneously. Be sure to provide a diagram for your answer. The input address line, line number & data output line must be specified precisely. (10%)

6. The clock interrupt handler on a certain computer requires 2 ms (including process switching overhead) per clock tick. The clock runs at 60 Hz. What fraction of CPU is devoted to the clock? (18%)

7. A computer has six tape drivers, with n processes competing for them. Each process may need two drivers. For which values of n is the system deadlock free? (18%)

8. A process with transaction timestamp 50 needs a resource held by a process with transaction timestamp 100. What happens in: (14%)
 - (a) Wait-die?
 - (b) Wound-wait?

