

國立高雄應用科技大學
100 學年度碩士班招生考試
電機工程系（丙組）

准考證號碼 （考生必須填寫）

計算機結構

試題 共 2 頁，第 1 頁

- 注意：a. 本試題共 5 題，每題 20 分，共 100 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

1. Explain the following terminologies: (20 分)
- (a) CPI (Clock cycles per instruction)
 - (b) PC (Program Counter)
 - (c) System call
 - (d) opcode

2. Consider three processors with different cache configurations as following:

- Cache1: Direct-mapped with one-word blocks,
- Cache2: Direct-mapped with four-word blocks,
- Cache3: Two-way set associative with four-word blocks.

The following miss rate measurements have been made:

- Cache1: Instruction miss rate is 4%; data miss rate is 6%,
- Cache2: Instruction miss rate is 2%; data miss rate is 4%,
- Cache3: Instruction miss rate is 2%; data miss rate is 3%.

For these processors, one-half of the instructions contain a data reference. Assume that the cache miss penalty is $6 + \text{Block size}$ in words. The CPI for this workload was measured on a processor with cache 1 and was found to be 2.0. Determine which processor spends the most cycles on cache misses. (20 分)

（下頁有試題）

3. Consider two RAID disk systems that are meant to store 10 terabytes of data (not counting any redundancy). System A uses RAID 1 technology, and System B uses RAID 5 technology with four disks in a “protection group.”
- (a) How many more terabytes of storage are needed in System A than in System B?
 - (b) Suppose an application writes one block of data to the disk. If reading or writing a block takes 30 ms, how much time will the write take on System A in the worst case? How about on System B in the worst case?
 - (c) Is System A more reliable than System B? (20 分)
4. Suppose there are five computers connected together to form a local area network. The maximum data transport rate (bandwidth) that the network cable can provide is 10Mbps. If we use a low-end device (HUB) to connect them, all the computers in the network share the 10 Mbps bandwidth. If we use a high-end device (Switch), then any two of the computers can communicate with each other without disturbing the other computers. If you want to download a 30MB (Bytes) file from a remote server, which is located outside your local network, how long will it take if using a HUB? How long will it take if using a Switch? Assume the other four computers only communicate with each other, and each has a constant data rate of 2Mbps. (20 分)
5. (a) What decimal number does this two’s complement binary number present:
1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 0101 1001 1010_{two},
- (b) Convert -2468_{ten} into a 32-bit two’s complement binary number. (20 分)