

# 國立嘉義大學九十七學年度 資訊工程學系碩士班招生考試試題

## 科目：計算機概論

1. (a) Suppose the following program, written in the machine language of Appendix A, is stored in main memory beginning at address 30 (hexadecimal). What task will the program perform when executed? (10%)

2003 2101 2200 2310 1400 3410 5221 5331 3239 333B B248 B038 C000

- (b) Suppose the memory cells at addresses 00 through 03 in the machine described in Appendix A contain the following bit patterns: (10%)

Address	Contents
00	23
01	02
02	C0
03	00

- a. Translate the first instruction into English.
- b. If the machine is started with its program counter containing 00, what bit pattern is in register 3 when the machine halts?

### Appendix A: Machine Language

Each machine instruction is two bytes long. The first 4 bits provide the op-code; the last 12 bits make up the operand field. The table that follows lists the instructions in hexadecimal notation together with a short description of each. The letters R, S, and T are used in place of hexadecimal digits in those fields representing a register identifier that varies depending on the particular application of the instruction. The letters X and Y are used in lieu of hexadecimal digits in variable fields not representing a register.

Op-code	Operand	Description
1	RXY	LOAD the register R with the bit pattern found in the memory cell whose address is XY.
2	RXY	LOAD the register R with the bit pattern XY.
3	RXY	STORE the bit pattern found in register R in the memory cell whose address is XY.
4	ORS	MOVE the bit pattern found in register R to register S.
5	RST	ADD the bit patterns in registers S and T as though they were two's complement representations and leave the result in register R.
B	RXY	JUMP to the instruction located in the memory cell at address XY if the bit

pattern in register R is equal to the bit pattern in register 0. Otherwise, continue with the normal sequence of execution. (The jump is implemented by copying XY into the program counter during the execute phase.)

C      000      HALT execution.

2. (a) What incorrect information is generated by the following schedule of transactions T1 and T2? (5%)

T1 is designed to compute the sum of accounts A and B; T2 is designed to transfer \$100 from account A to account B. T1 begins by retrieving the balance of account A; then, T2 performs its transfer; and finally, T1 retrieves the balance of account B and reports the sum of the values it has retrieved.

- (b) Explain how the locking protocol described in the above text would resolve the error produced in Problem a. (5%)
3. What's the major difference between a class and an object in terms of an object-oriented programming? (10%)
4. Explain the following questions?  
 (a) What is the difference between a strong mobility and a weak mobility? (5%)  
 (b) Is Java Applet a form of strong mobility or weak mobility? Why? (5%)
5. Please describe (list the details of) information/messages from Assembler to Loader and Linker for Program Relocation and Program Linking, respectively. (10%)
6. Please describe the actions in a Machine Cycle. (5%)
7. Please use Karnaugh map (K-map) to simplify  $yz + x'y + x'z + xy'z$ . (5%)
8. What is pipelining, and what type of programming way will impact (i.e., greatly reduce) the merit of using pipelining? (10%)
9. What is the Hamming distance between 010110010 and 100100011? (5%)
10. Please state three types of communications between CPU and I/O, and briefly describe the actions of three communication types. (15%)