University of Toronto
Faculty of Applied Science and Engineering
Final Examination, April 16, 2001
Fourth Year-Program: Mechanical and Industrial Engineering
MIE 438S: Microprocessors Applications
Examination Type: A
Examiners - Andrew A. Goldenberg and William W. Melek

QUESTION 1 (20%)

Given the diagram in Figure 1,

(i) Identify what tasks could this unit perform.

(ii) For each task identified in (i), what is the state of each switch (S_1, S_2, S_3, and S_4).

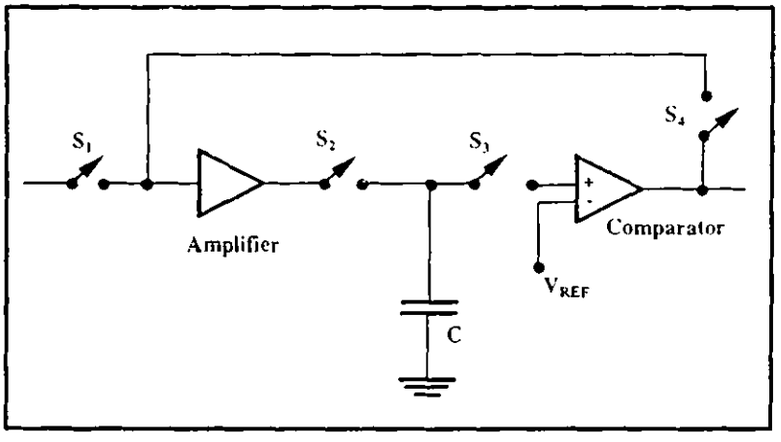

Figure 1

QUESTION 2 (23%)

(a) Define the following terms:

1. Stepper motor slew range.
2. Software Latency.
3. Pipelining of the CPU instructions.

(b) Compare between the RISC and CISC microprocessor architectures in terms of efficiency, speed of operation, the complexity of instructions used, and the other features discussed in the classroom.

(c) Discuss the differences and similarities between SRAM and DRAM.

QUESTION 3 (20%)

The circuit shown in Figure 2 performs successive approximation A/D conversion. Demonstrate that the circuit performs this function.

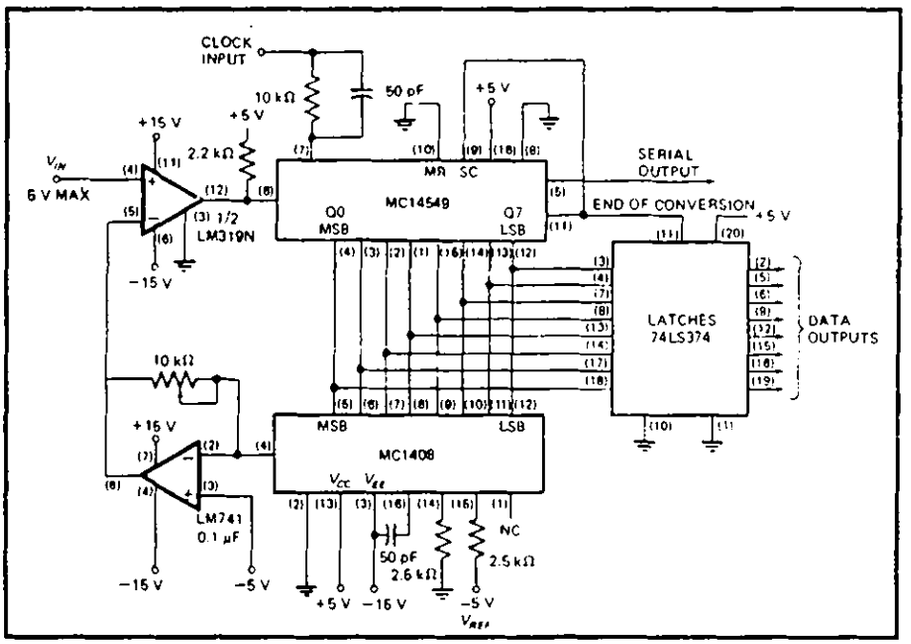

Figure 2

QUESTION 4 (22%)

Figure 3 represents an H-circuit for stepper motor control,

(i) Assuming CW rotation, provide the switching table for full-step drive.

(ii) Assuming CCW rotation, provide the switching table for a half-step drive.

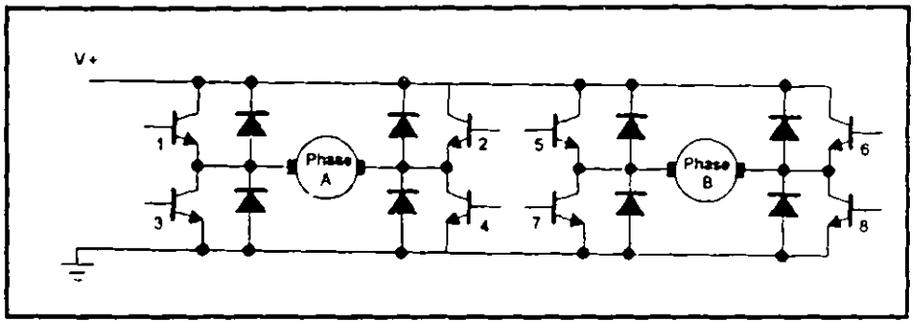

Figure 3

Question 5 (15%)

Identify the gate shown in Figure 4. Explain the logic that the identified gate implements.

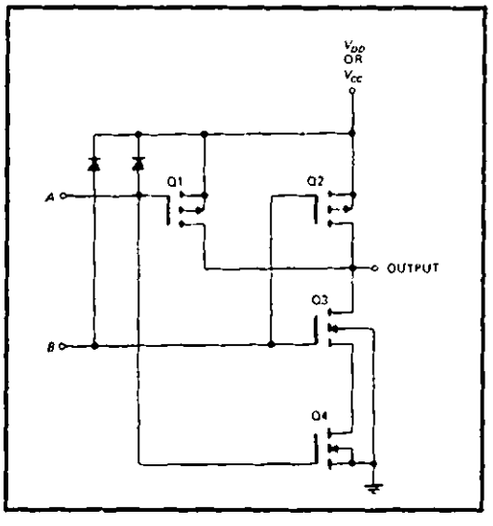

Figure 4