國立雲林科技大學 107 學年度
碩士班招生考試試題

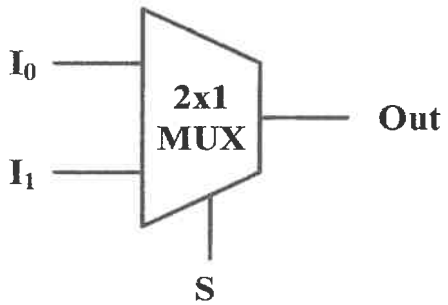
系所：電子系
科目：計算機概論(1)

1. Convert the following 2's complement binary numbers to decimal. (20%)
(a) 1010
(b) 0110
(c) 01011010
(d) 11111110
(e) 0011100111010011

2. Implement the XOR function by means of : (10%)
(a) NAND gates only.
(b) NOR gates only.
Please draw the gate-level circuit.

3. Implement a 4-to-1 mux using only 2-to-1 muxes making sure to properly connect all of the terminals. Remember that you will have 4 inputs, 2 control signals, and 1 output. Write out the truth table for this circuit. (10%)

4. A symbol of 2-to-1 mux is listed below. Please draw the gate-level circuit of 2-to-1 mux. (10%)



5. Given an array of 100 elements. Write an algorithm or C program with comments to do bubble sort. Draw a flowchart. How many comparisons and how many swaps the algorithm will take at worst? What is the time complexity of this algorithm? Which sorting algorithm is faster than bubble sort? (13%)

6. Describe a Turing machine. What are the similarities between a Turing machine and a personal computer? What are the differences? (13%)

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7. Write an algorithm to find all the prime numbers less than or equal to n. Use comments to explain your program and draw a flowchart to illustrate the algorithm. Show that your algorithm work for n=25 (12%)

8. Write down the Euclidean algorithm to find the greatest common divisor between two positive integers a and b. You cannot use any division or mod function but you can use subtraction. Write down a recursive version of the Euclidean algorithm. This recursive version can use the mod function. Show that both algorithms work with two examples for each algorithm? (12%)