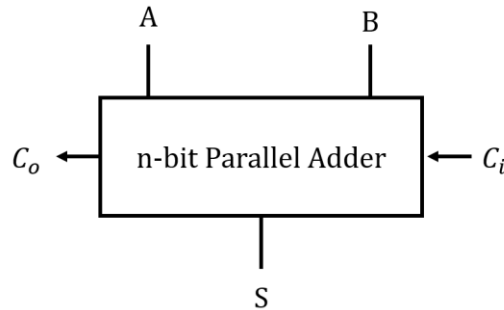
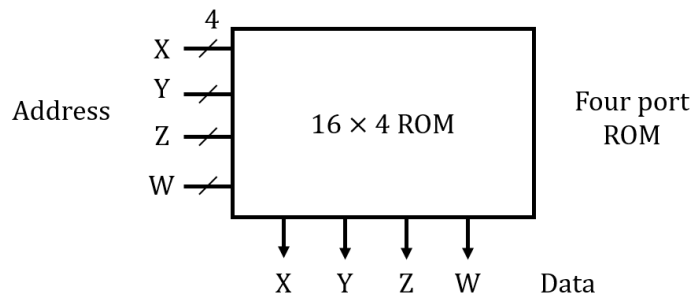


EE446 Homework - 1

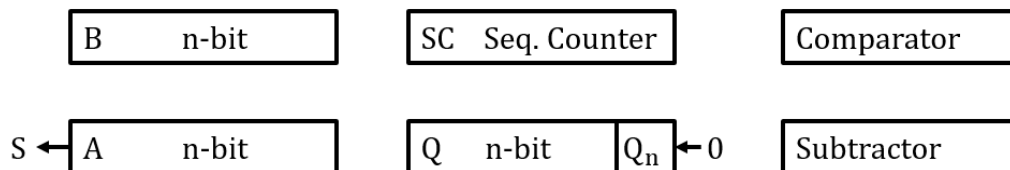
Q1) A and B are n-bit unsigned numbers. Using the following parallel adder, design a magnitude comparator in simplest for by giving all details and complete circuit diagram. The outputs of comparator are $X = 1$ denotes $A > B$, $Y = 1$ denotes $A \leq B$, $Z = 1$ denotes $A = B$. You can use any kind of gates.



Q2) Two 4-bit unsigned numbers $A = a_1a_2a_3a_4$ and $B = b_1b_2b_3b_4$ will be multiplied using ROM look up table method. You are given one 16×4 bit four port memory as shown below and full adders. Give detailed circuit diagram of the multiplier using minimum number of full adders. Also give contents of ROM.

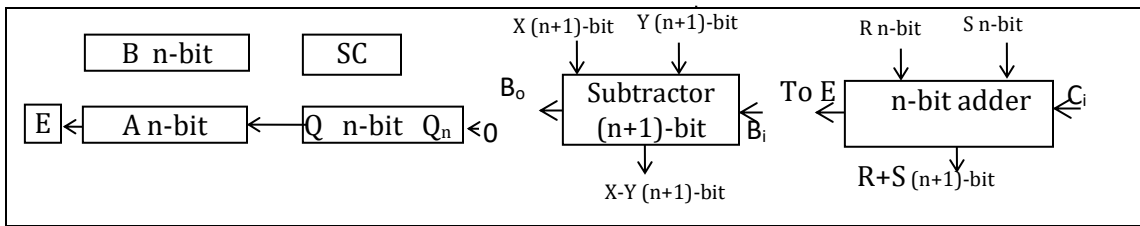


Q3) The following Hardware is given:



- a) Derive a division algorithm and give its hardware flow chart of two unsigned binary numbers P and T to find the ratio $\frac{P}{T}$, where P is a $2n$ -bit and T is an n -bit number. Assume no divide overflow. For the algorithm you derived define and state the properties of the comparator and subtractor.
- b) Apply your algorithm to the numbers: $n = 3$, $P = 011100$, $T = 101$. Fill in the following table. Check your result.

Q4) An arithmetic processor configuration for unsigned binary numbers is given below:



Using the above arithmetic processor, give a hardware flowchart to divide 2n-bit **unsigned** binary number to an n-bit unsigned binary number. Consider overflow condition. Apply your flowchart to numbers N_1 : 101010 (dividend) N_2 : 110 (divisor). Fill in a suitable table to show all steps. Verify your result.