

Physics 4700 Homework VII

Due April 13

1. Convert $(49)_{10}$ to the following
 - a. $()_2$
 - b. $()_8$
 - c. $()_{16}$
2. Convert the following binary numbers to decimal:
 - a. 1110101.0110
 - b. 11.01010101...repeats
3. Diagram how would you implement the following functions using,
 - a. only NAND gates
 - b. only NOR gates

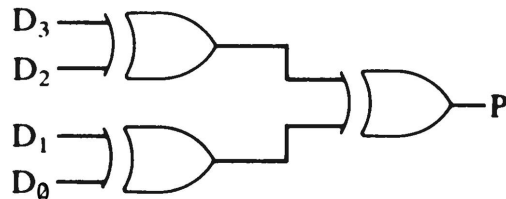
$$F = A \cdot \bar{B} + \bar{A} \cdot B$$

$$F = A \cdot B$$

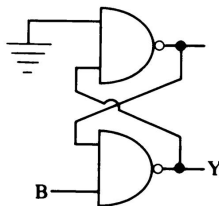
$$F = A + B$$

$$F = \bar{A}$$

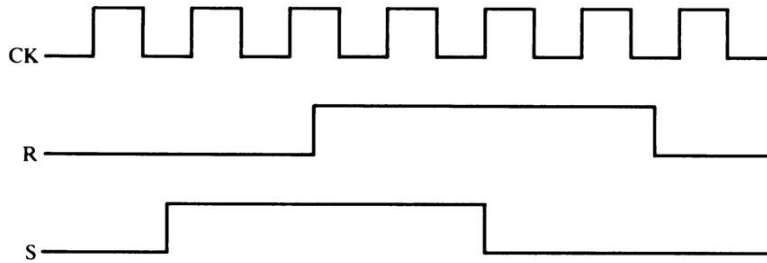
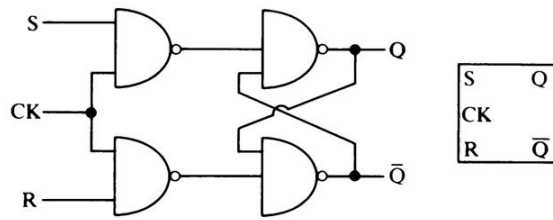
4. Write the truth table for P in terms of D_3, D_2, D_1, D_0 . What is P called?



5. What is the relationship between B and Y?

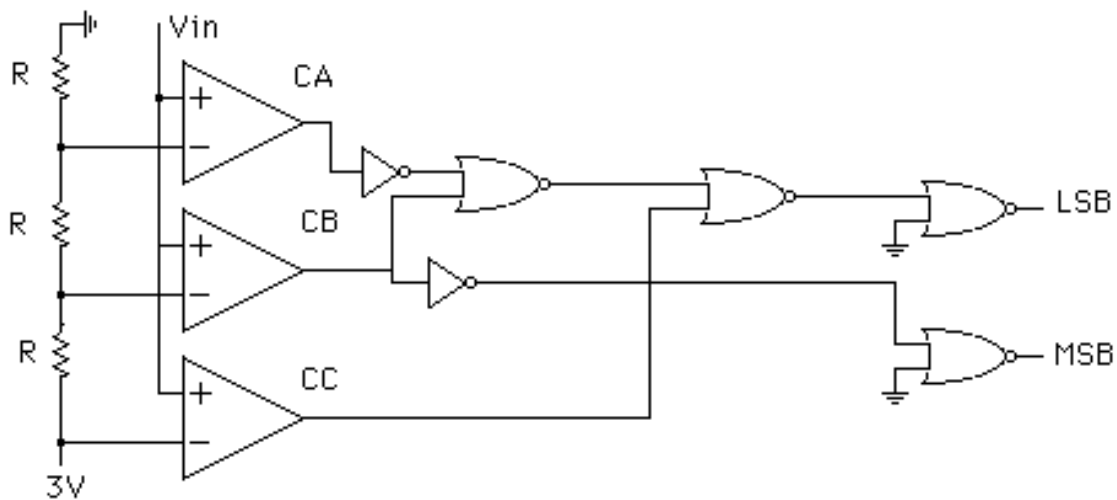


6. For the clocked RS flip-flop shown, with $Q = 0, \bar{Q} = 1$ initially, sketch Q. If R is held at 0, sketch Q for the CK and S inputs shown.



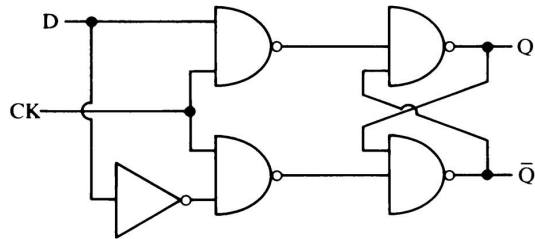
7. The following circuit can be used to convert an input analog voltage to a digital output voltage. C_A , C_B , and C_C are comparators which give a logic level 1 if the positive input (+) is greater than the negative input. The outputs, LSB and MSB stand for least significant bit and most significant bit respectively. Complete the following truth table. ~~You will have a chance to build something similar to this in lab.~~

$V_{\text{input}} \text{ (V)}$	C_A	C_B	C_C	LSB	MSB
0.5					
1.5					
2.3					
4.0					



8. For the following circuit

- Write a truth table.
- Write a standard schematic diagram for this flip-flop.
- This flip-flop is usually called a ____ flip-flop.



9. Design a synchronous counter that will count through the sequence 1, 3, 5, 7, 9, 1, 3, 5, 7, 9... using JK flip-flops.