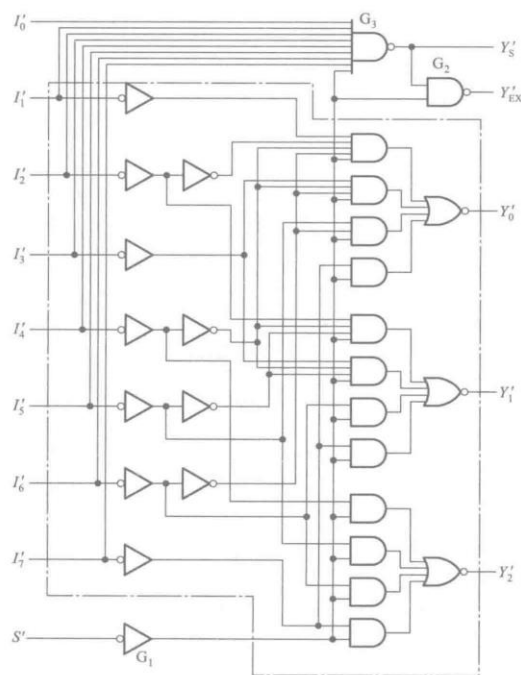


EE115B-Digital Circuits
2nd semester AY 2021/2022
HW3
Due on June 12, 2022

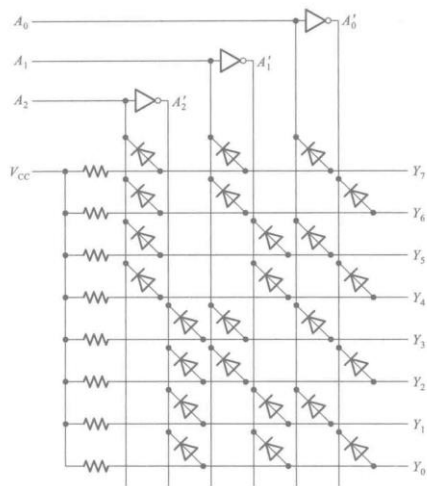
Write down your name on this page, and name your submission file as HW3-"your name", otherwise your submission will not be marked.

1. Based on the circuit of the priority encoder 74HC138, write down the expression of Y'_2 , Y'_1 , Y'_0 ,

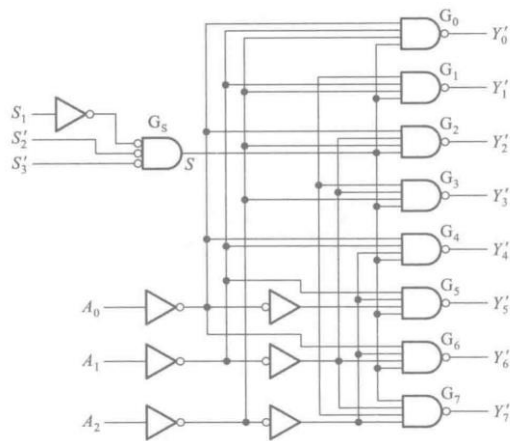
Y'_{EX} , Y'_S , and check if they are identical to those on the lecture notes. (6 marks)



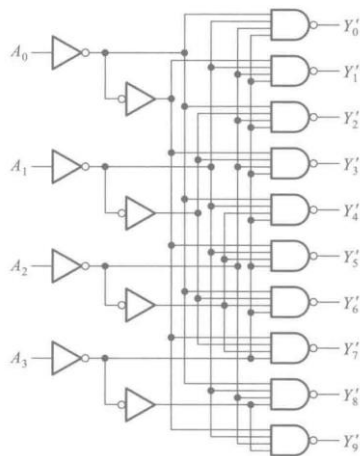
2. Based on the circuit of 3–8 decoder, write down the expression of Y_7 to Y_0 , and check if they are identical to those on the lecture notes. (6 marks)



3. Based on the circuit of 3–8 decoder 74HC138, write down the expression of Y'_7 to Y'_0 , and check if they are identical to those on the lecture notes. (6 marks)



4. Based on the circuit of Binary-Decimal Decoder, write down the expression of Y'_9 to Y'_0 , and check if they are identical to those on the lecture notes. (6 marks)

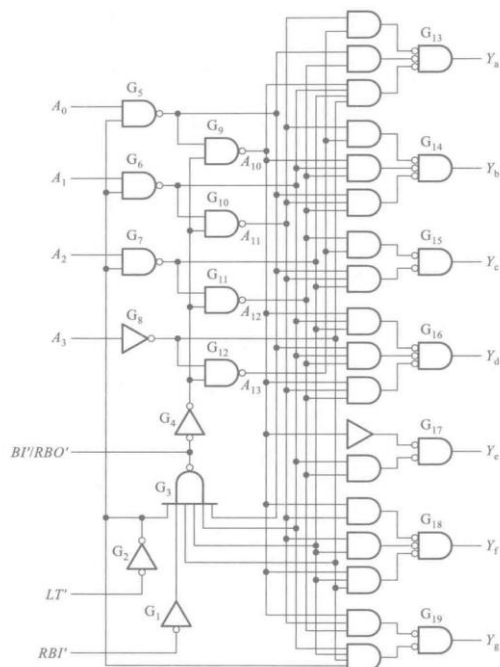


5. For the BCD to 7-Segment Decoder

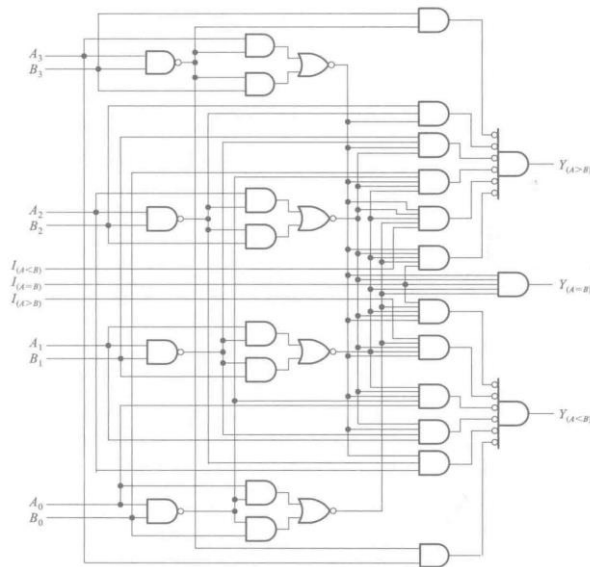
(a) Based on the truth table, write down the expression of Y_g to Y_a , using the Karnaugh map, check if they are identical to those on the lecture notes. (10 marks)

输入					输出								字形
数字	A_3	A_2	A_1	A_0	Y_a	Y_b	Y_c	Y_d	Y_e	Y_f	Y_g		
0	0	0	0	0	1	1	1	1	1	1	0	0	
1	0	0	0	1	0	1	1	0	0	0	0	1	
2	0	0	1	0	1	1	0	1	1	0	1	2	
3	0	0	1	1	1	1	1	1	0	0	1	3	
4	0	1	0	0	0	1	1	0	0	1	1	4	
5	0	1	0	1	1	0	1	1	0	1	1	5	
6	0	1	1	0	0	0	1	1	1	1	1	6	
7	0	1	1	1	1	1	1	0	0	0	0	7	
8	1	0	0	0	1	1	1	1	1	1	1	8	
9	1	0	0	1	1	1	1	0	0	1	1	9	
10	1	0	1	0	0	0	0	1	1	0	1	10	
11	1	0	1	1	0	0	1	1	0	0	1	11	
12	1	1	0	0	0	1	0	0	0	1	1	12	
13	1	1	0	1	1	0	0	1	0	1	1	13	
14	1	1	1	0	0	0	0	1	1	1	1	14	
15	1	1	1	1	0	0	0	0	0	0	0	15	

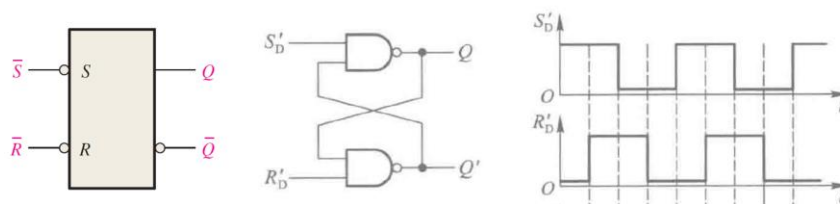
(b) Based on the circuit, write down the expression of Y_g to Y_a , check if they are identical to those on the lecture notes. (6 marks)



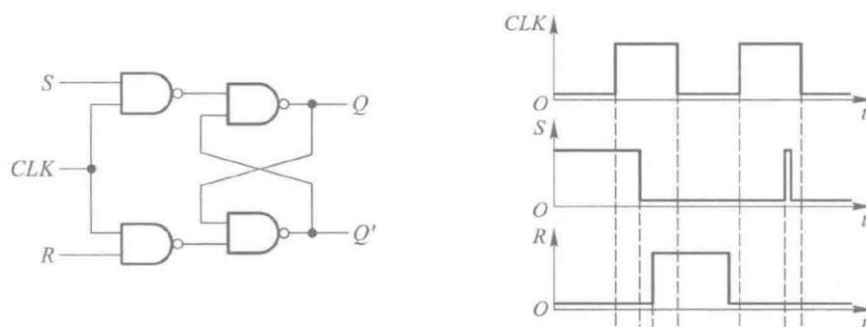
6. Based on the circuit of 4 bits comparators (74HC85), write down the expression of $Y_{(A>B)}$, $Y_{(A=B)}$ and $Y_{(A<B)}$, and check if they are identical to those on the lecture notes. (6 marks)



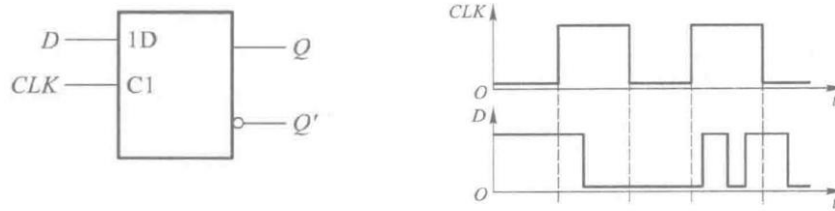
7. Plot the waveform of Q and Q' (6 marks)



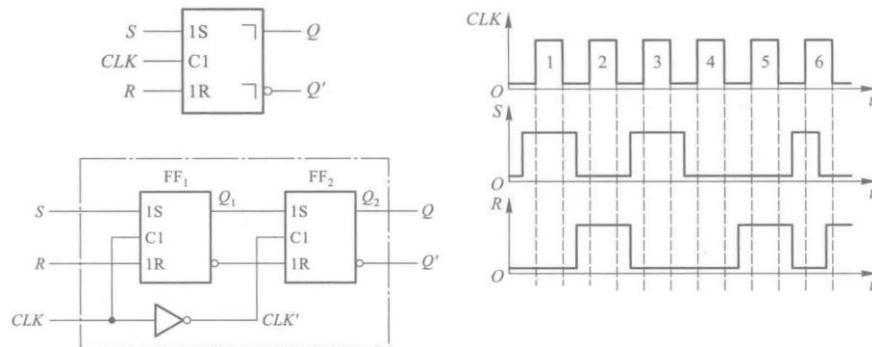
8. Plot the waveform of Q and Q' , assume the initial Q is 0. (6 marks)



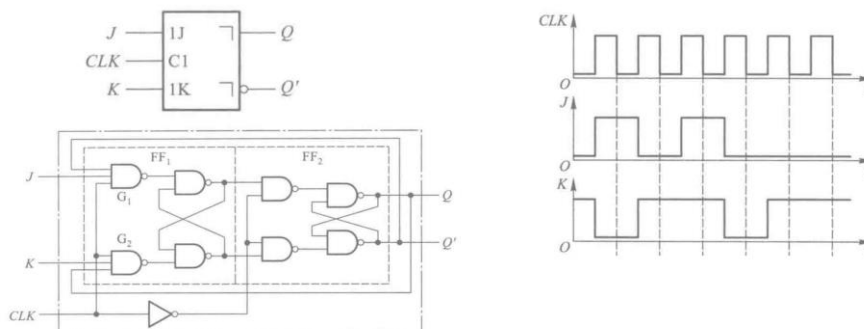
9. Plot the waveform of Q and Q' , assume the initial Q is 0. (6 marks)



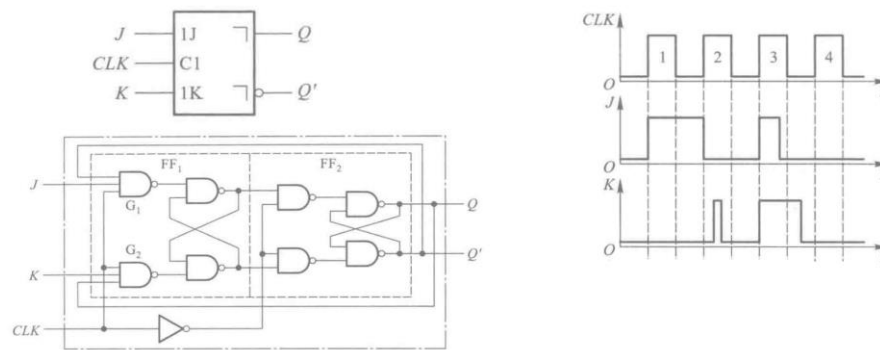
10. Plot the waveform of Q and Q' , assume the initial Q and Q_1 are 0. (6 marks)



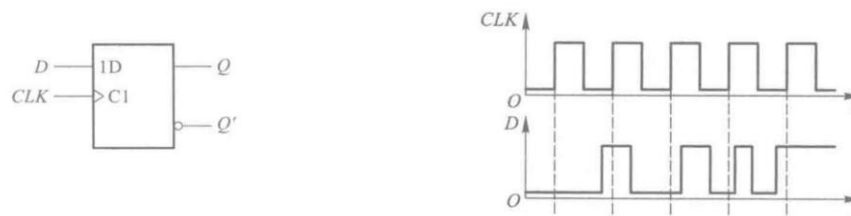
11. Plot the waveform of Q and Q' , assume the initial Q and the output of the master stage are 0. (6 marks)



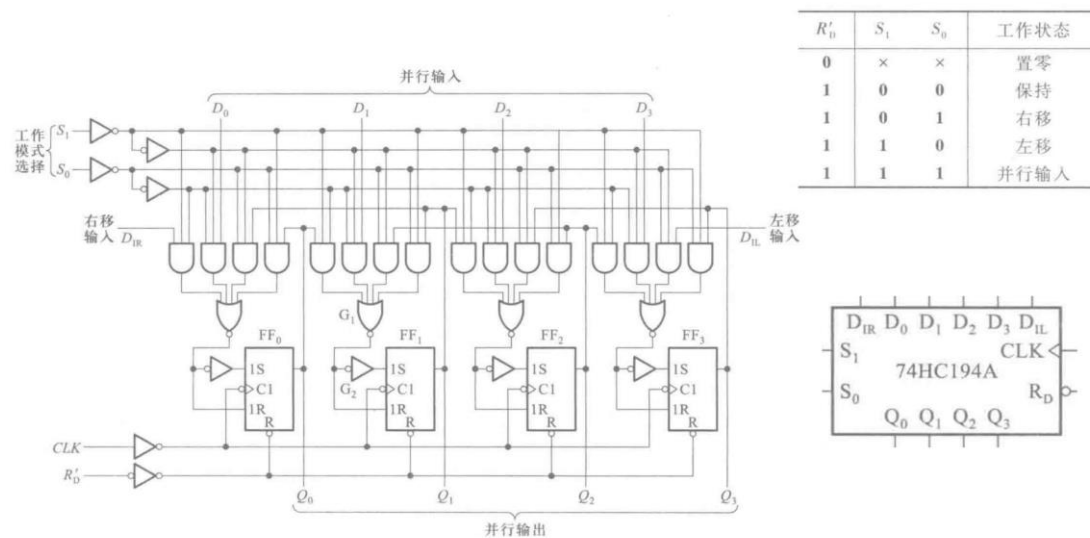
12. Plot the waveform of Q and Q' , assume the initial Q and the output of the master stage are 0. (6 marks)



13. Plot the waveform of Q and Q' , assume the initial Q is 0. (6 marks)



14. Analyze how does FF_2 realize the shift left, shift right, parallel load and hold functions. (6 marks)



15. Based on the 4-bits Up Synchronous Binary Counter, design the Up Synchronous Decimal Counter. (Don't look at the lecture notes) (6 marks)

