



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECB231 – DIGITAL ELECTRONICS

Modulo N Counter/ 19ECB231/ DIGITAL
ELECTRONICS/P.Umamaheswari
/AP/ECE/SNSCT

II YEAR/ III SEMESTER

UNIT 3 – SEQUENTIAL CIRCUITS

TOPIC – Modulo n Counters



Modulus Counter (MOD-N Counter)



The 2-bit counter is called as MOD-4 counter and 3-bit counter is called as MOD-8 counter. So in general, an n-bit counter is called as modulo-N counter. Where, MOD number = 2^n .

- 2-bit up or down (MOD-4)
- 3-bit up or down (MOD-8)
- 4-bit up or down (MOD-16)



Design Synchronous MOD-6 Counter Using JK flip flop

Step 1 : Find number of flip-flops required to build the counter.

Flip-flops required are : $2^n \geq N$.

Here $N = 6 \quad \therefore n = 3$

i.e. Three flip-flops are required.

Step 2 : Write an excitation table for JK flip-flop.

Q_n	Q_{n+1}	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0



Design Synchronous MOD-6 Counter Using JK flip flop



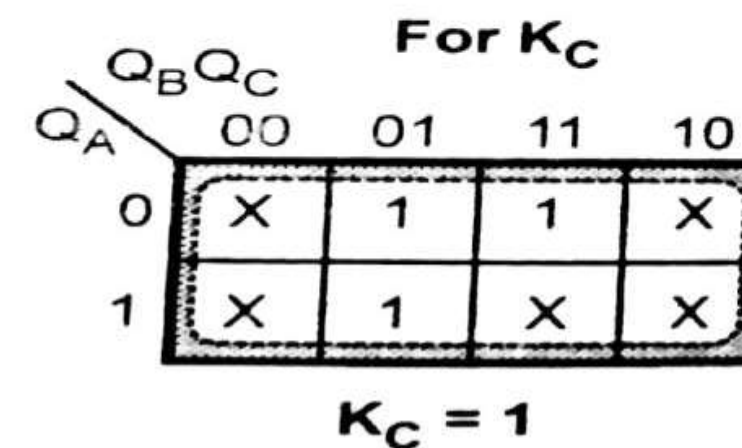
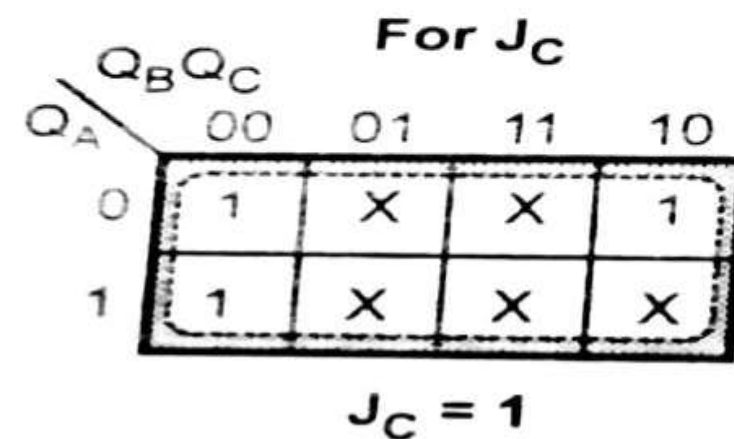
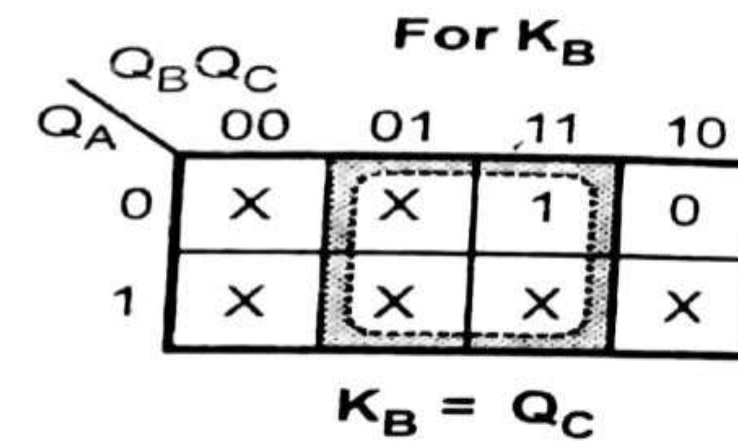
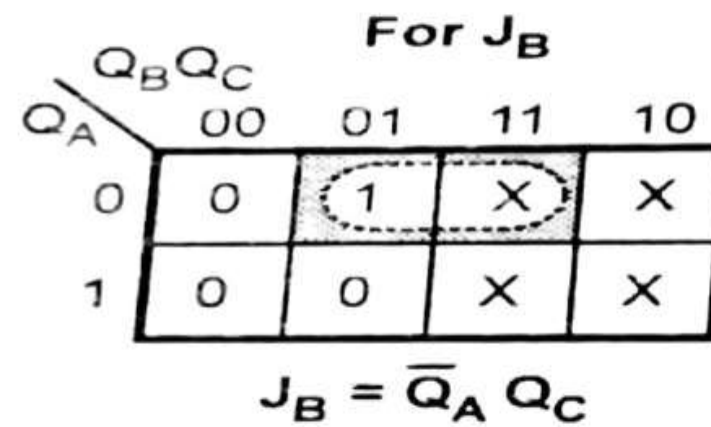
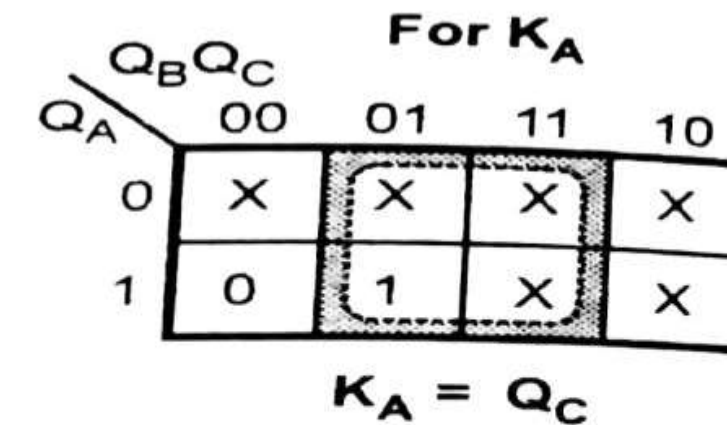
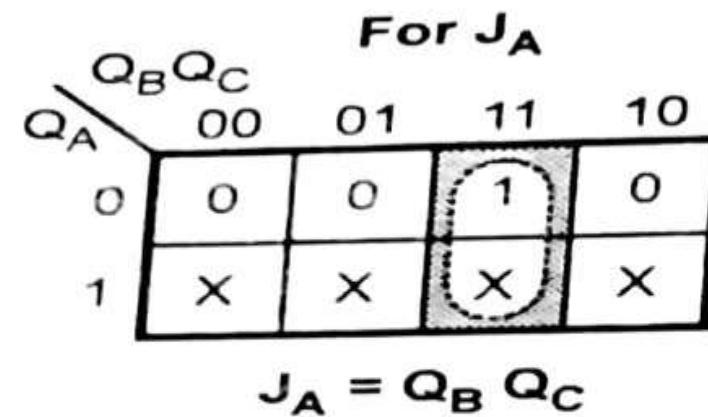
Step 3 : Determine the transition table.

Present state			Next state			Flip-flop inputs					
Q _A	Q _B	Q _C	Q _{A+1}	Q _{B+1}	Q _{C+1}	J _A	K _A	J _B	K _B	J _C	K _C
0	0	0	0	0	1	0	x	0	x	1	x
0	0	1	0	1	0	0	x	1	x	x	1
0	1	0	0	1	1	0	x	x	0	1	x
0	1	1	1	0	0	1	x	x	1	x	1
1	0	0	1	0	1	x	0	0	x	1	x
1	0	1	0	0	0	x	1	0	x	x	1
1	1	0	x	x	x	x	x	x	x	x	x
1	1	1	x	x	x	x	x	x	x	x	x



Design Synchronous MOD-6 Counter Using JK flip flop

Step 4 : K-map simplification for flip-flop inputs.





Design Synchronous MOD-6 Counter Using JK flip flop



Step 5 : Implement the counter.

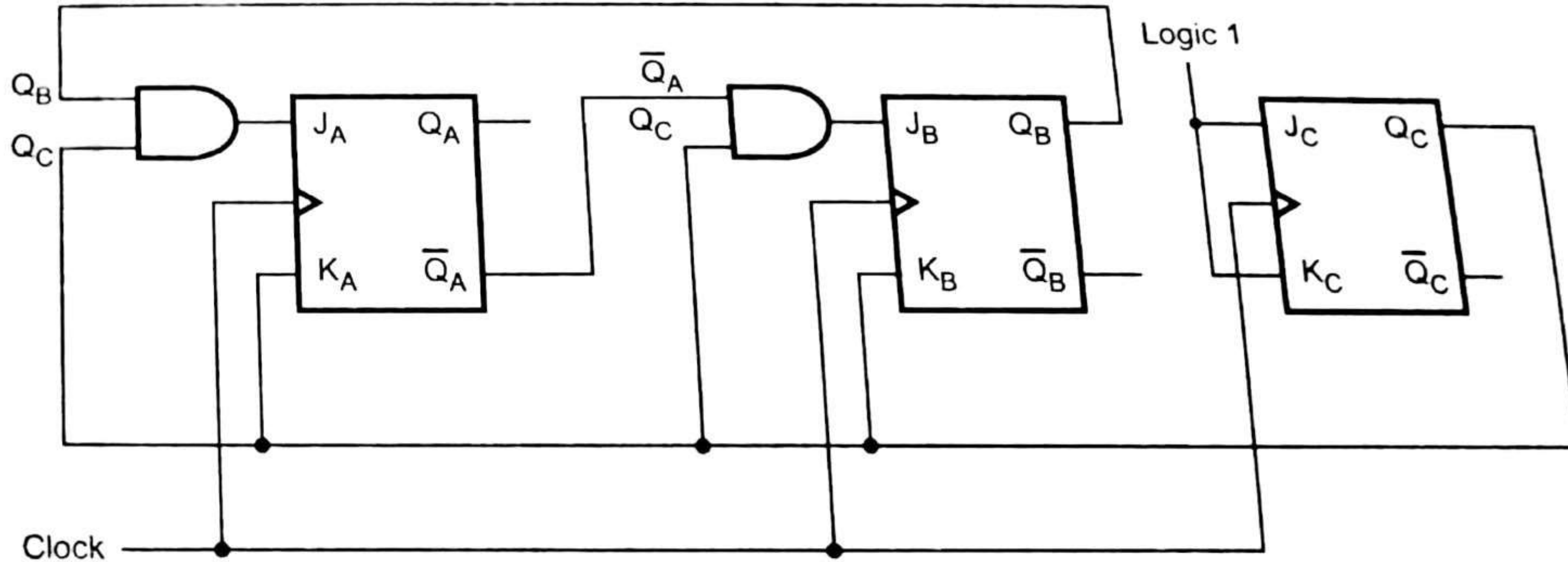


Fig. 7.79 Implementation of MOD 6 synchronous counter



Design Synchronous MOD-6 Counter Using D flip flop



Step 1 : Find number of flip-flops required to build the counter.

Flip-flops required are : $2^n \geq N$

Here $N = 6 \therefore n = 3$

i.e. Three flip-flops are required.



Design Synchronous MOD-6 Counter Using D flip flop



Step 2 : Determine the transition table.

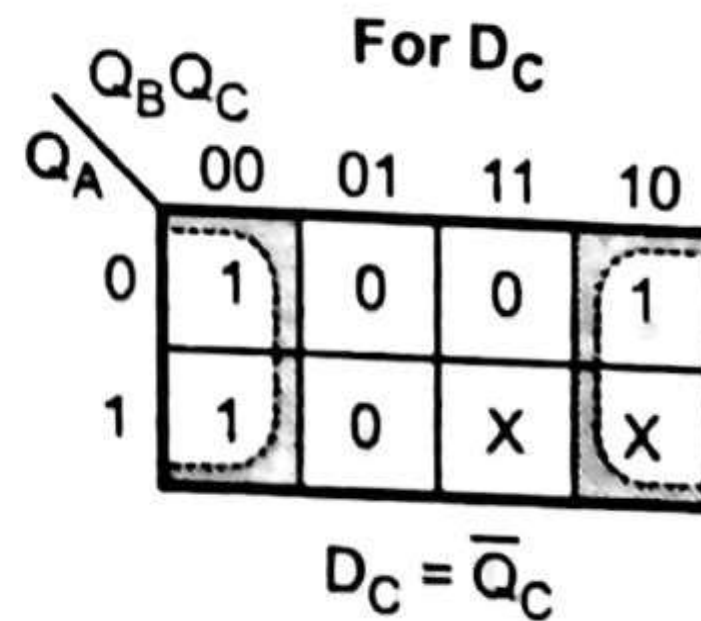
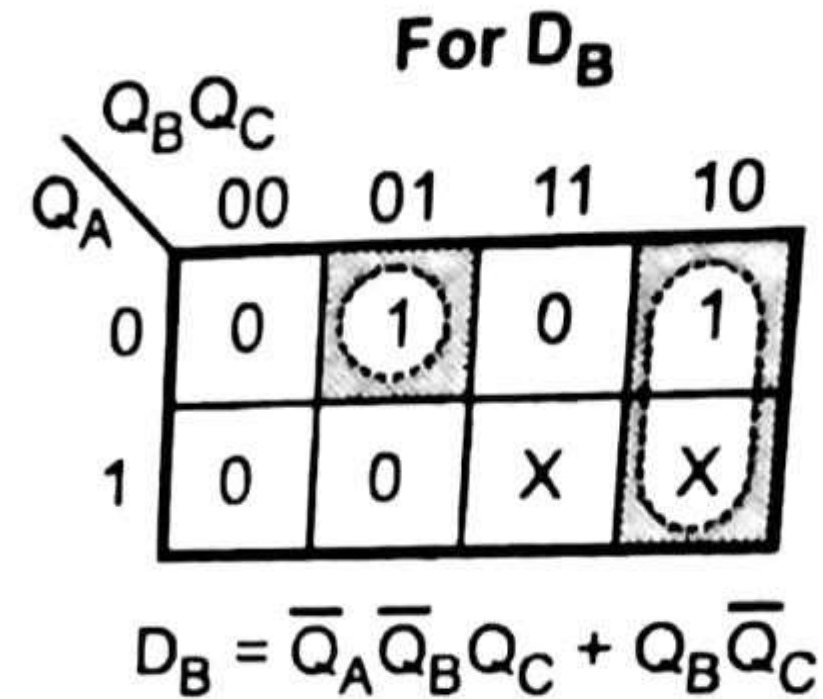
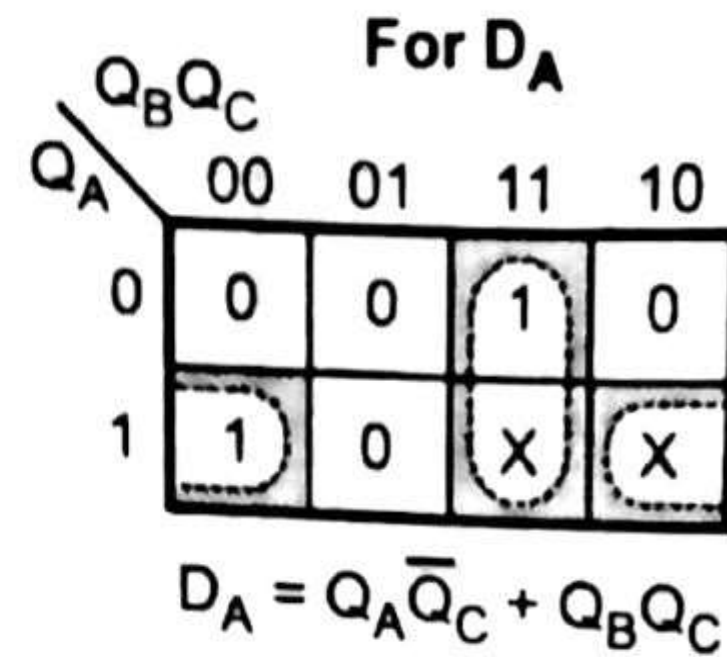
Present state			Next state		
Q_A	Q_B	Q_C	Q_{A+1}	Q_{B+1}	Q_{C+1}
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	1
0	1	1	1	0	0
1	0	0	1	0	1
1	0	1	0	0	0
1	1	0	x	x	x
1	1	1	x	x	x



Design Synchronous MOD-6 Counter Using D flip flop

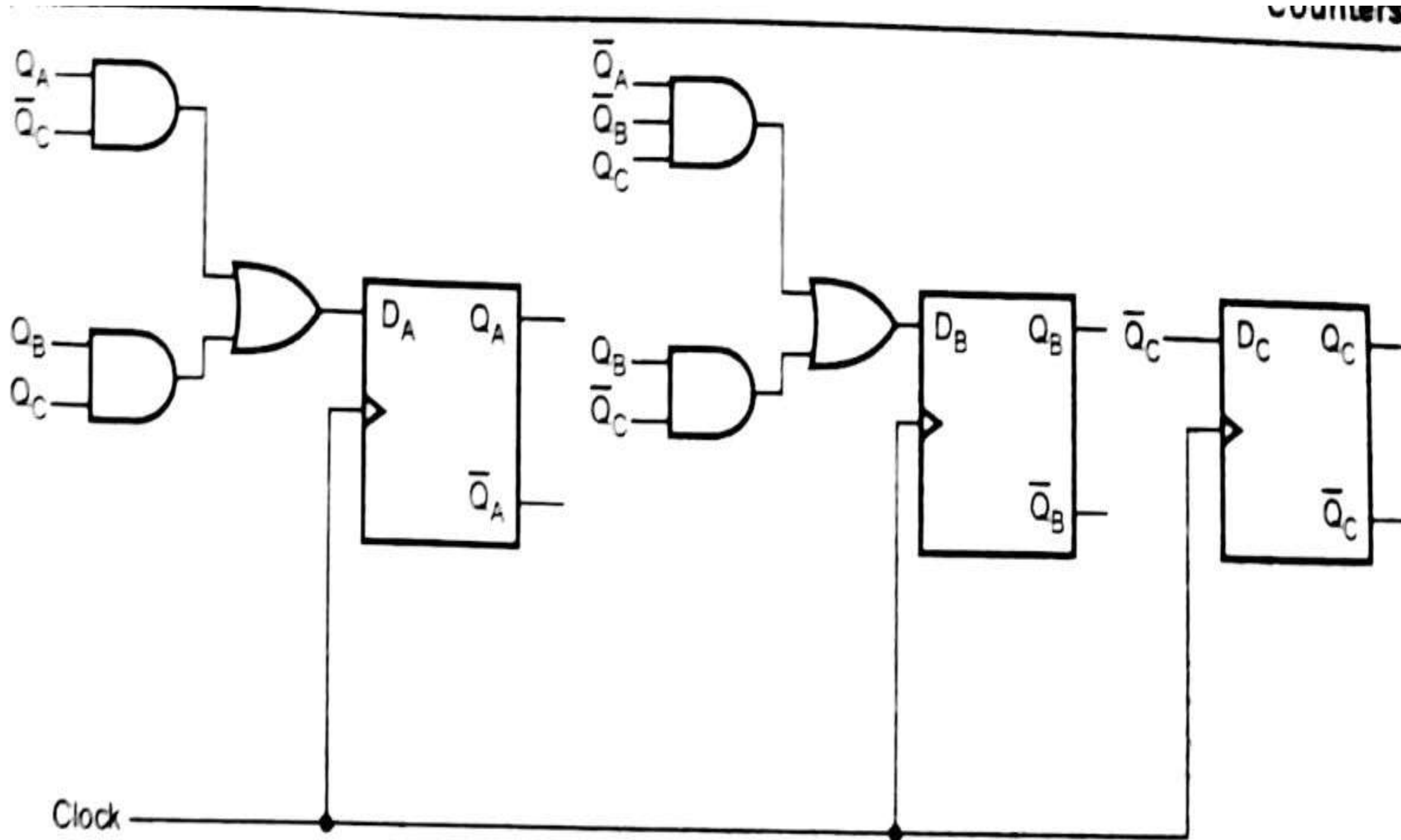


Step 3 : K-map simplification for flip-flop inputs.





Design Synchronous MOD-6 Counter Using D flip flop





ASSESSMENTS



- 1.What is MOD N Counter?
- 2.Design MOD 5 counter using T flip flop.
- 3.Difference between synchronous and Asynchronous counter .



THANK YOU