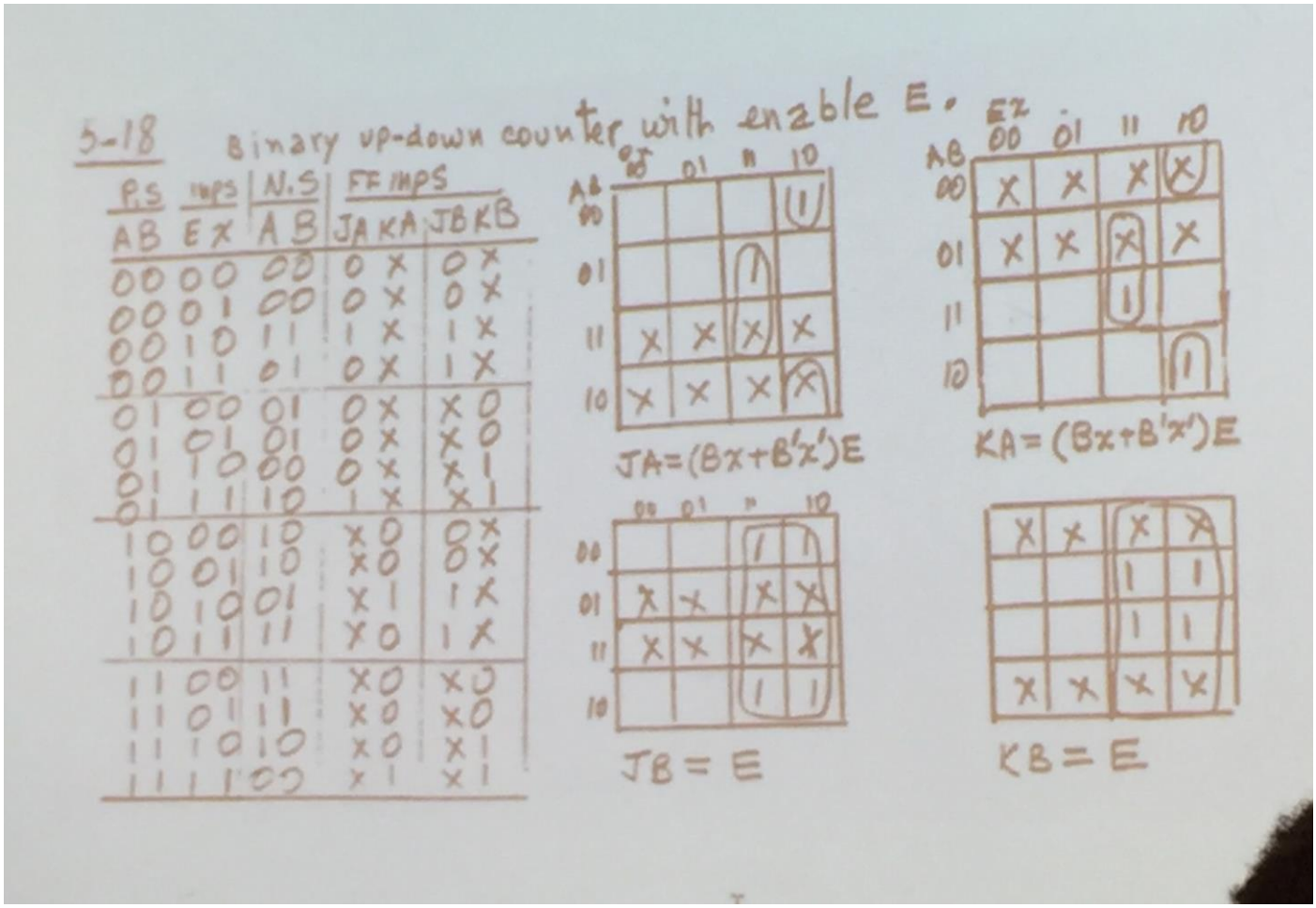
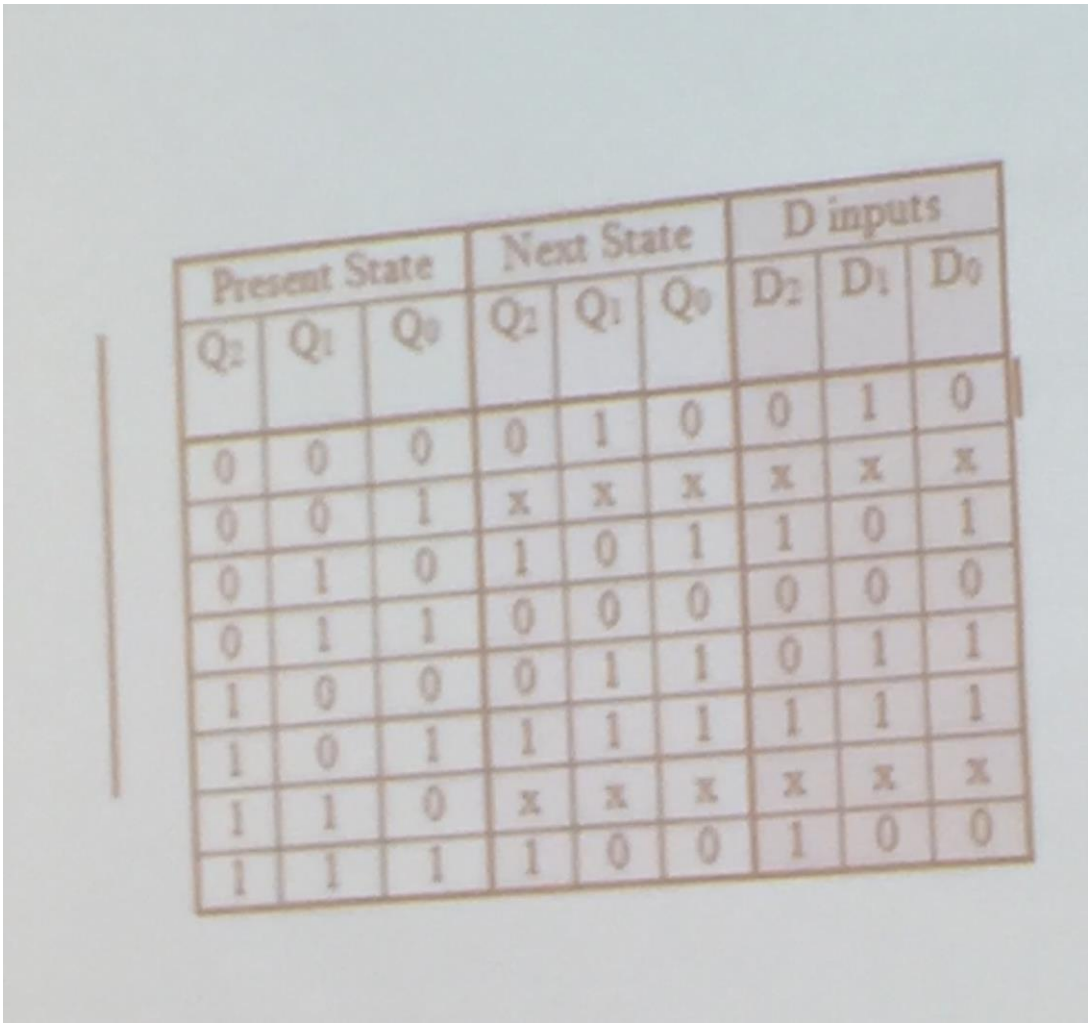
Correction DGD 5 :

Correction 1 :



Correct 2 :



Present State			Next State			D inputs		
Q_2	Q_1	Q_0	Q_2	Q_1	Q_0	D_2	D_1	D_0
0	0	0	0	1	0	0	1	0
0	0	1	x	x	x	x	x	x
0	1	0	1	0	1	1	0	1
0	1	1	0	0	0	0	0	0
1	0	0	0	1	1	0	1	1
1	0	1	1	1	1	1	1	1
1	1	0	x	x	x	x	x	x
1	1	1	1	0	0	1	0	0

(ii) Using Karnaugh maps, find the minimal sum-of-products form of the equations for the inputs to the flip-flops, assume the next states of the unused combinations to be "don't care states"

D_2

Q_2 \ Q_1Q_0	00	01	11	10
0	0	x	0	1
1	0	1	1	x

2 $D_2 = Q_2 \cdot \overline{Q}_0 + Q_1 \cdot \overline{Q}_0$

D_1

Q_2 \ Q_1Q_0	00	01	11	10
0	1	x	0	0
1	1	1	0	x

1 $D_1 = \overline{Q}_1$

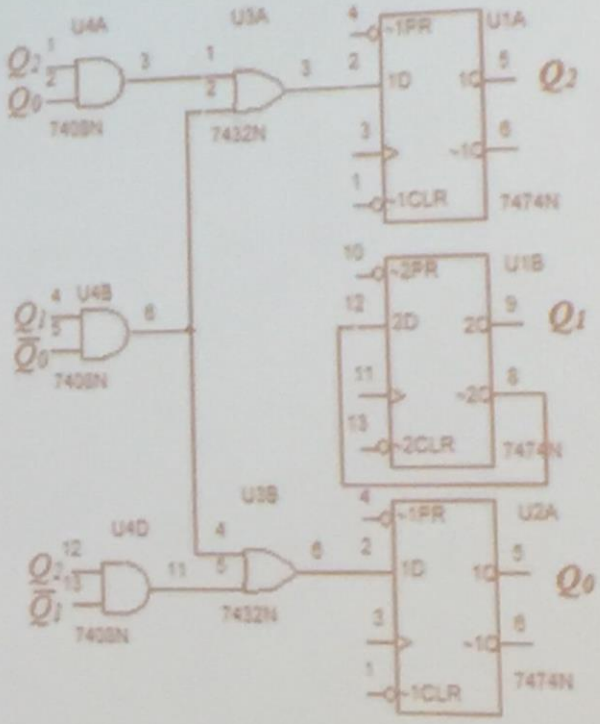
D_0

Q_2 \ Q_1Q_0	00	01	11	10
0	0	x	0	1
1	1	1	0	x

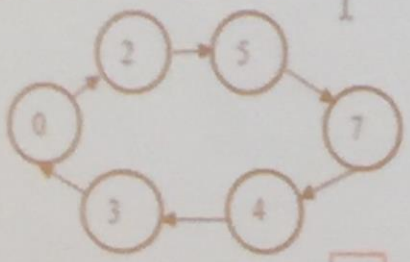
2 $D_0 = Q_2 \cdot \overline{Q}_1 + Q_1 \cdot \overline{Q}_0$

(iii) Draw the logic diagram of the counter

6

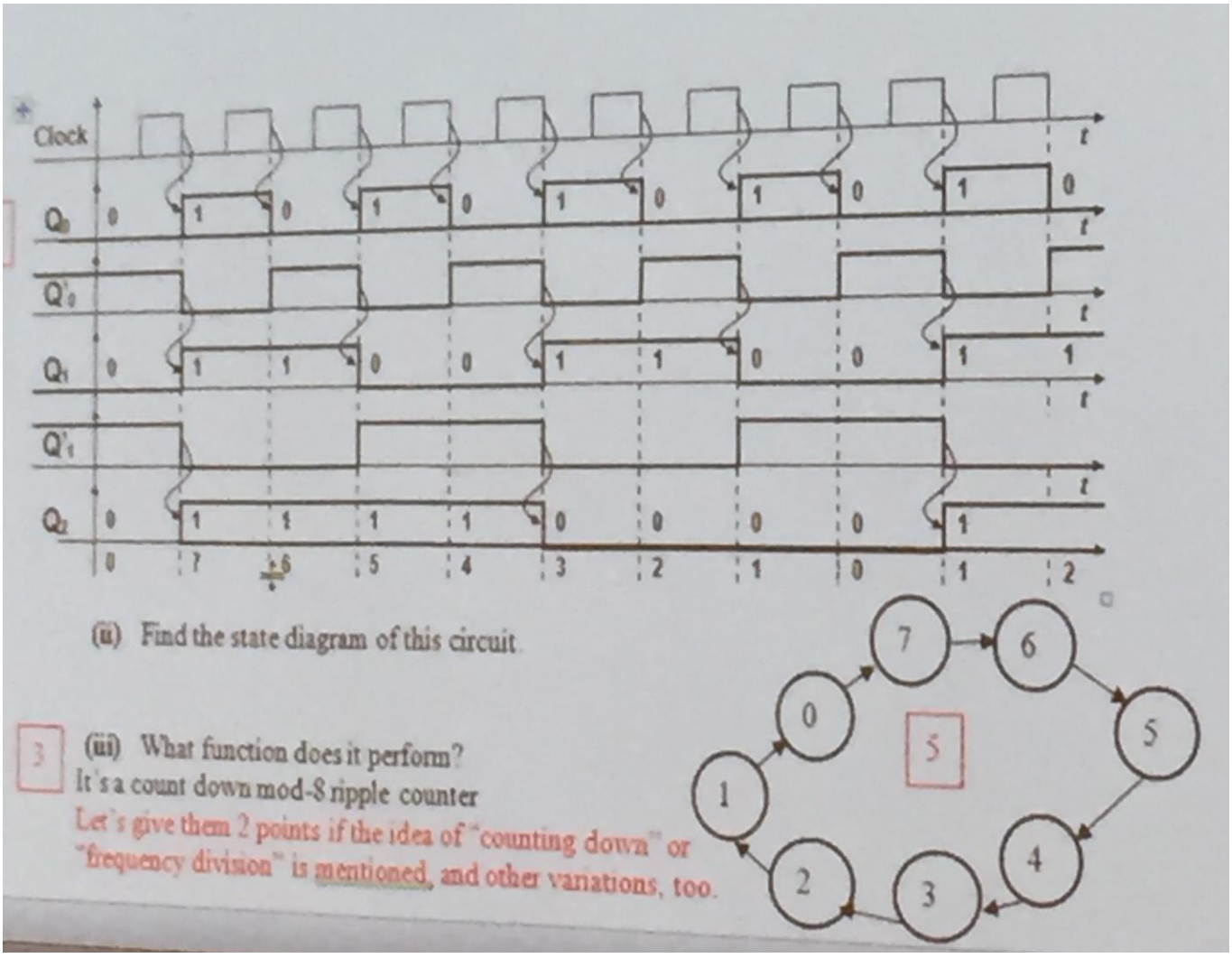


(iv) Draw the state diagram.



3

Correction 3 :



(ii) Find the state diagram of this circuit.

3 (iii) What function does it perform?

It's a count down mod-8 ripple counter

Let's give them 2 points if the idea of "counting down" or "frequency division" is mentioned, and other variations, too.

Revision Bascule :

SR Latch :

S → Set
R → Reset

Characteristic Equation:
$Q(t+1) = S + Q(t)\cdot\bar{R}$

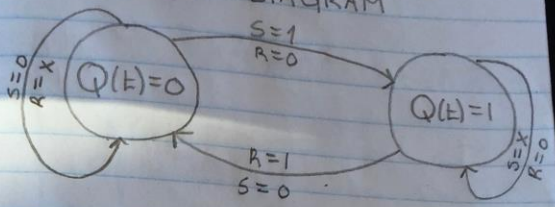
CHARACTERISTIC TABLE

S	R	Q(t+1)	Function
0	0	Q(t)	Hold
0	1	0	Reset
1	0	1	Set
1	1	Ind	Forbidden (non sense)

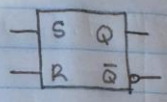
EXCITATION TABLE

Q(t)	Q(t+1)	S	R
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0

STATE DIAGRAM



BLOCK DIAGRAM →



JK Flip Flop :

Characteristic Equation:
$Q(t+1) = \bar{Q}(t)\cdot J + Q(t)\cdot\bar{K}$

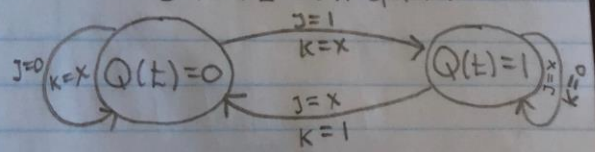
CHARACTERISTIC TABLE

J	K	Q(t+1)	Function
0	0	Q(t)	Hold
0	1	0	Reset
1	0	1	Set
1	1	$\bar{Q}(t)$	Toggle

EXCITATION TABLE

Q(t)	Q(t+1)	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

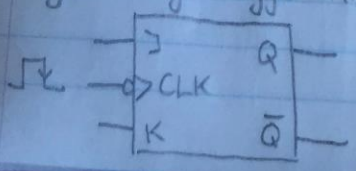
STATE DIAGRAM

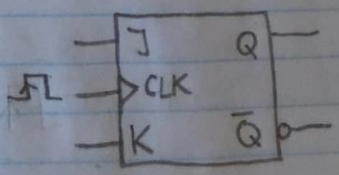


BLOCK DIAGRAM → Positive Edge Triggered (rising edge)

↓

Negative Edge Triggered (falling edge)



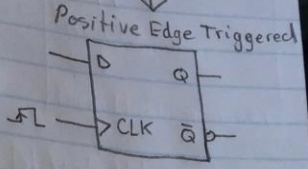


D Flip Flop :

CHARACTERISTIC TABLE

En	D	Q(t)	Q(t+1)	Function
1	0	0	0	Reset
1	0	1	0	Reset
1	1	0	1	Set
1	1	1	1	Set
0	X	Q(t)	Q(t)	No change

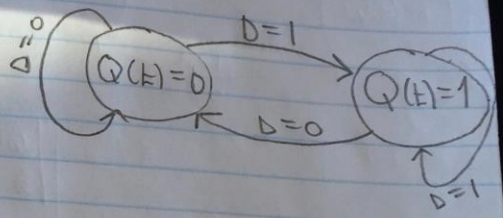
BLOCK DIAGRAM



EXCITATION TABLE

Q(t)	Q(t+1)	D
0	0	0
0	1	1
1	0	0
1	1	1

STATE DIAGRAM



Characteristic Equation :

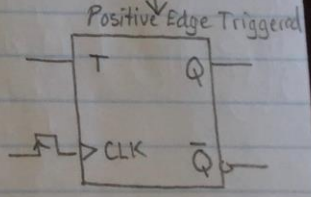
$Q(t+1) = D$

T Flip Flop :

CHARACTERISTIC TABLE

T	Q(t)	Q(t+1)	Function
0	0	0	No change
0	1	1	No change
1	0	1	Toggle
1	1	0	Toggle

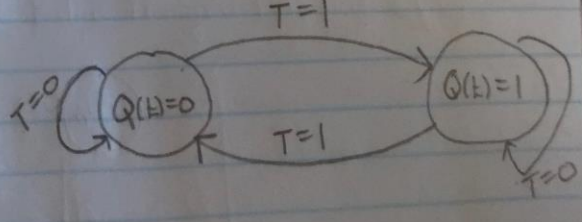
BLOCK DIAGRAM



Characteristic Equation:

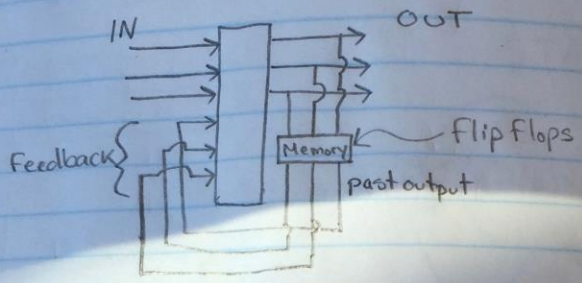
$Q(t+1) = \overline{Q(t)} \cdot T + Q(t) \cdot \overline{T}$

STATE DIAGRAM



Sequential Circuits :

- output depends on the present input as well as the output of previous inputs
- Feedback signal + memory element present
- FlipFlops, counters, registers.



Synchronous Sequential Circuit	Asynchronous Sequential Circuit
The status of memory element is affected only at the active edge of clock if input is changed	The status of memory element will change anytime as soon as input is changed
Flip Flops are used	Latches are used
Clock present	No clock is present