

EECS 303 HW4 SOLUTION Page 1

1. Unate covering: two-level logic minimization
 binate covering: technology mapping

(c) SAT	A	B	C	D
$A+B+C$	1	1	1	
$A+C+\bar{D}$	1		1	0
$D+D$		1		1
$\bar{A}+\bar{B}+\bar{C}+\bar{D}$	0	0	0	0

$$A B C D = X 1 X 0$$

(b) $A B C D = 0 1 0 0$

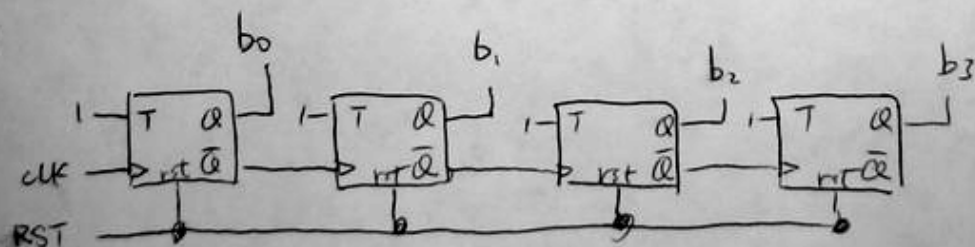
2. (a) $F = B\bar{C} + \bar{A}C + \bar{A}B$

(b) $F = \bar{A}\bar{C}\bar{D} + \bar{A}B + B\bar{C}D + BCD + A\bar{C}D + A\bar{B}D$

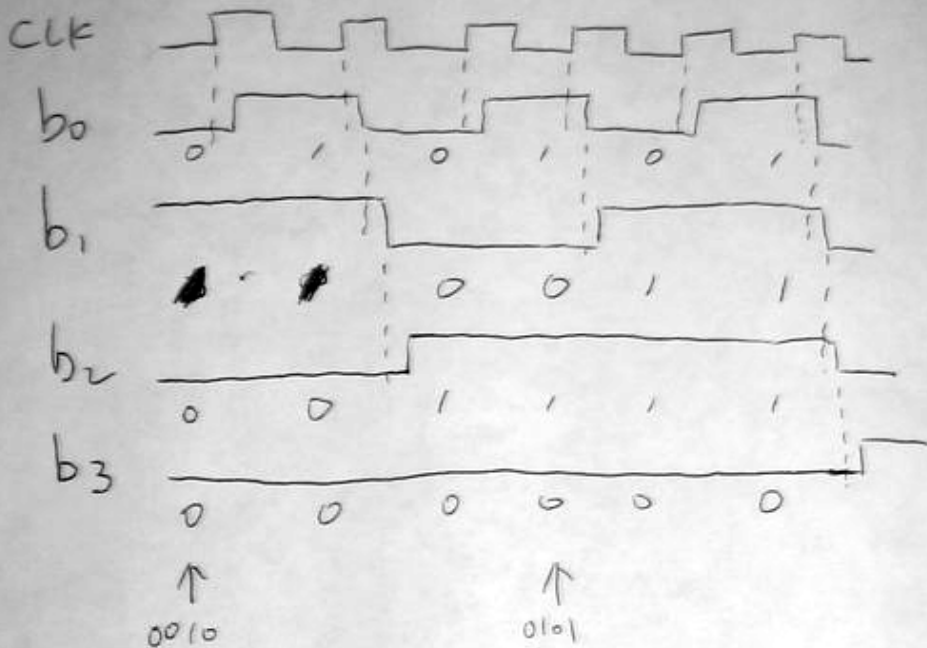
(c) $F = A$

(d) $F = (A+\bar{D})(\bar{B}+\bar{D})(C+\bar{D})(B+C)$

3. (a)



(b)



(c)

$$D = T \oplus Q = \overline{T}Q + T\overline{Q} = \overline{\overline{T}Q} \overline{\overline{T}\overline{Q}}$$

4.

B	0				
C	BC	DC			
D	BC	DC	FC		
E	BC	0	1	FE	
F	0	BC	1	FA	0
	A	B	C	D	E

Covering

$\{C, F\}, \{C, E\} / \overline{\{C, D\}} + \overline{\{C, F\}}, \overline{\{B, C\}} + \overline{\{C, D\}}, \overline{\{A, C\}} + \overline{\{B, C\}}$

$\textcircled{A} \textcircled{B} \textcircled{C} \textcircled{D} \textcircled{E} \textcircled{F} \quad \{C, F\} \textcircled{\{C, E\}} \overline{\{C, D\}} \overline{\{B, C\}} \overline{\{A, C\}}$

A	1								
B		1							
C			1						
D				1					
E					1				
F						1			

$\overline{\{C, D\}} + \overline{\{C, F\}}$

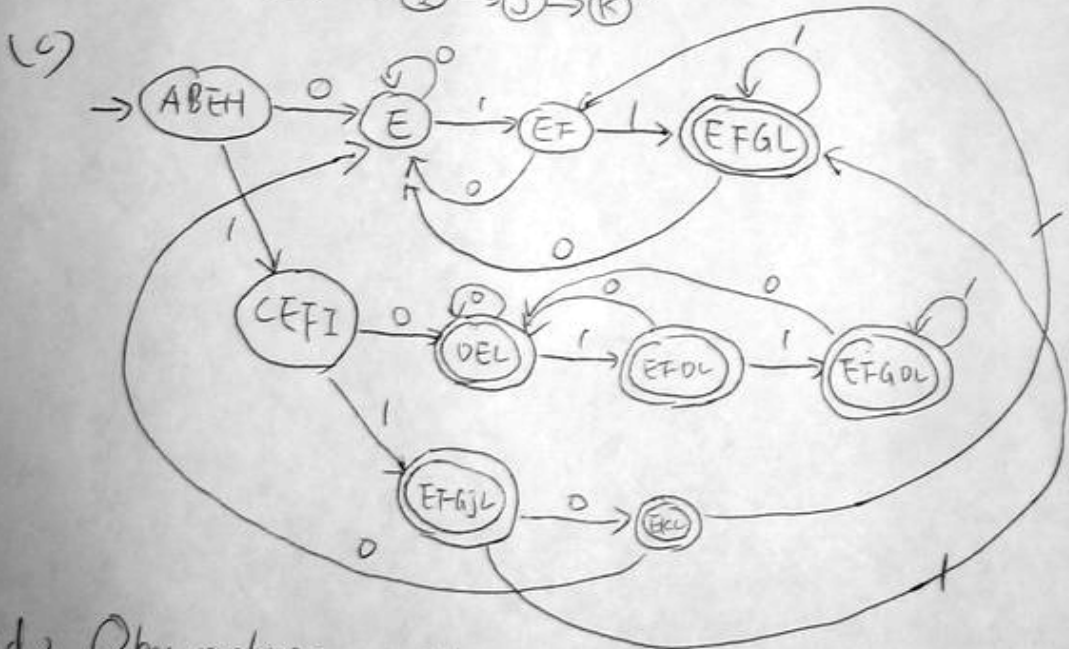
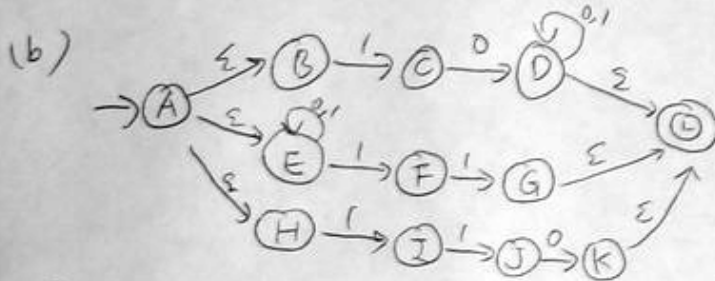
$\overline{\{B, C\}} + \overline{\{C, D\}}$

$\overline{\{A, C\}} + \overline{\{B, C\}}$

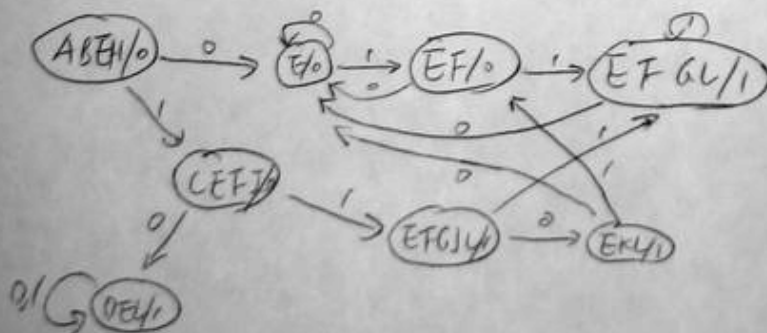
Choose A, B, D, F, {C, E}

CUR	NEXT		OUT
	0	1	
A	B	{C, E}	0
B	D	B	1
{C, E}	{E}	X	0
D	F	F	X
F	X	A	1

5. (a) $(0 + (1+0)^2 + (1+0)^*_{11} + 110$



(d) Obviously we can combine DEL, EFD, EFGD together

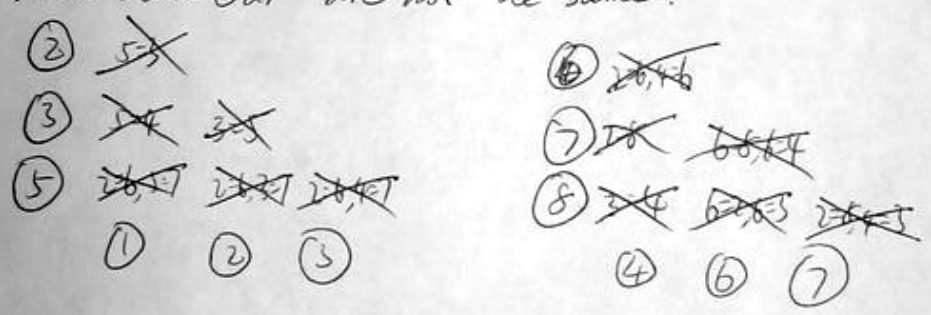


(e)

	CUR	NEXT		OUT
		0	1	
①	ABEH	E①	CEFD①	0
②	E	E①	EF①	0
③	EF	E①	EFGL①	0
④	EFGL	E①	EFGL①	1
⑤	CEFL	DELD①	EFGL①	0
⑥	DEL	DELD①	DEL①	1
⑦	EFGLJL	EKL①	EFGL①	1
⑧	EKL	E①	EF①	1

(f) No minimization possible.

Use two charts, one for ① ② ③ ④, the other for ⑤ ⑥ ⑦ ⑧
 Since their "OUT" are not the same.



(g) See (d), (f), 8 states ~~states~~ and 3 bits

(h)

		00	01	11	10
0		②	③	①	⑤
1		④	⑧	⑦	⑥

(i) Find the logic functions for each of the next state bits and the output bit in terms of the current state bits.