Transducers (finite)

Mealy & Moore M/c :-

- They are DFA with some o/p. There is no final state in these DFA.

6-tuple

$M(Q, \Sigma, \Gamma, \delta, \Delta, q_0)$

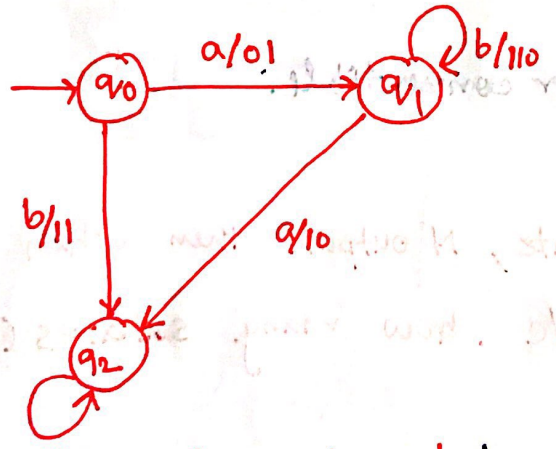
Γ : o/p alphabet

Δ : o/p func^n

$\delta_{Q \times \Sigma \to Q}$ — Mealy & Moore M/c

- Mealy : $\Delta_{Q \times \Sigma \to \Gamma^*}$ (o/p depends upon current state & I/p)
- Moore : $\Delta_{Q \to \Gamma^*}$ (o/p depends upon current state only)

Mealy M/c :-



δ, Δ	a	b
$\to q_0$	$q_1, 01$	$q_2, 11$
q_1	$q_2, 10$	$q_1, 110$
q_2	$q_2, 1$	$q_2, 0$

$\delta(q_0, a) = q_1$

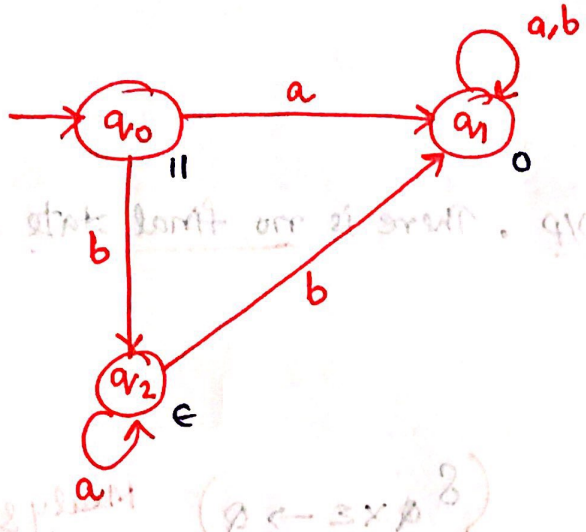
$\Delta(q_0, a) = 01$

ask, we can see o/p = 01 depends upon q_0 & a

I/p :- aabba

o/p :- 0110001

Moore M/c :-



O/P is associated with state only

	a	b	O/P
→ q_0	q_1	q_2	11
q_1	q_1	q_1	0
q_2	q_2	q_1	ϵ

I/P :- aabba
O/P :- 11000000

I/P :- baaba
O/P :- 11ϵϵϵ00 = 1100

NOTE:- Mealy & Moore are not equivalent as there O/P may or maynot be same for a given I/P.

Mealy and Moore are interconvertible.

Q. A Mealy M/c of M state, N output then when we convert it into Moore M/c, how many satates (atmost) are there.

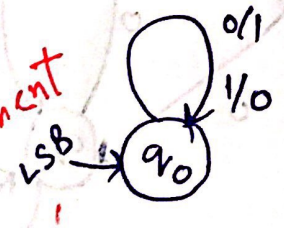
M State, N - O/P Mealy M/c ⟹ (Moore M/c ≤ mn+1 States)
or
≤ mn

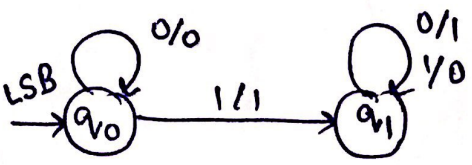
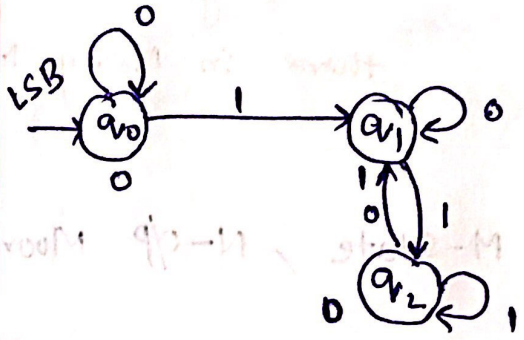
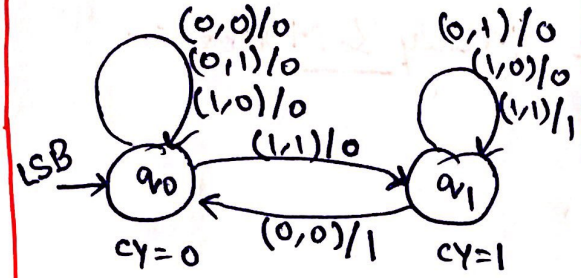
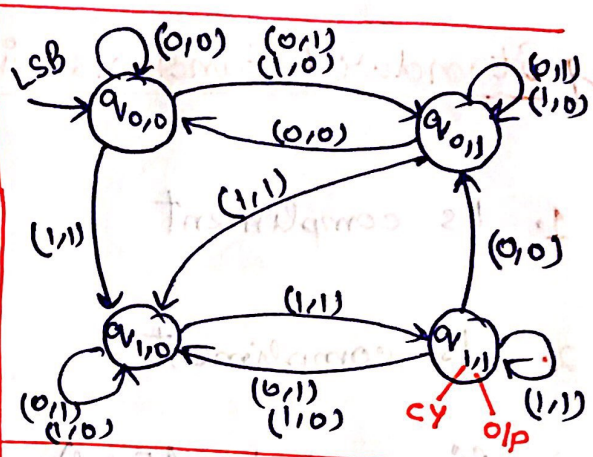
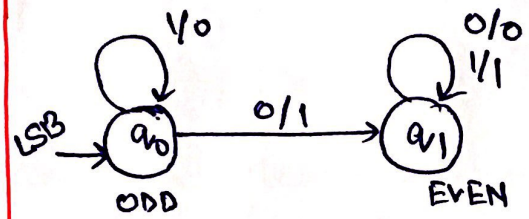
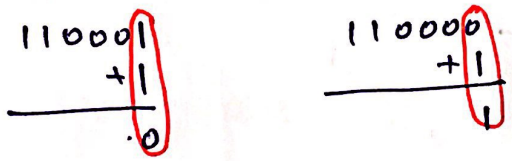
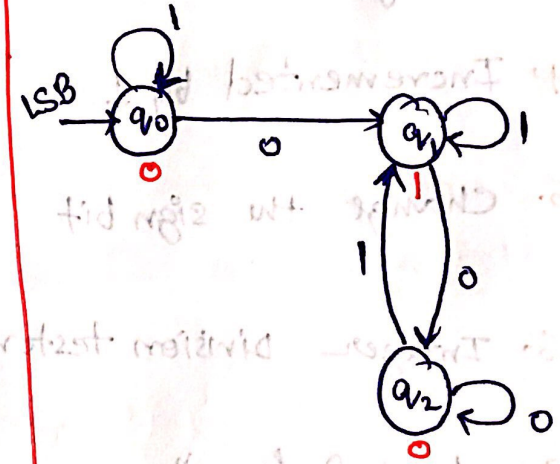
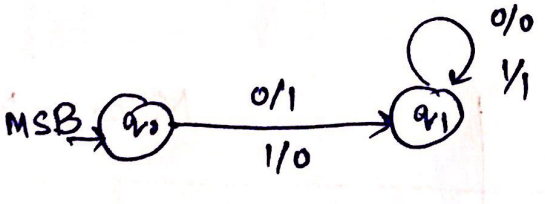
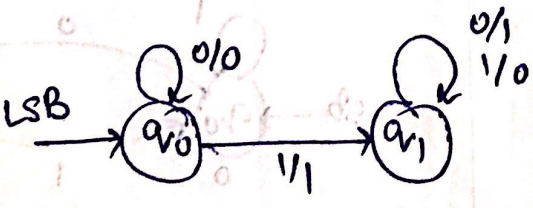
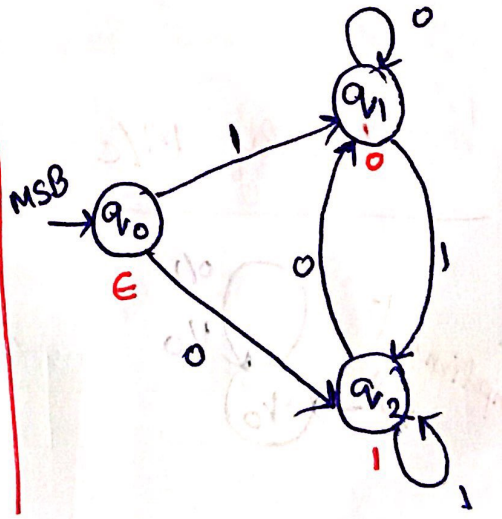
Q. M-state, and N-output Moore M/c when converted to Mealy M/c. How many states (atmost) will be there in Mealy M/c.

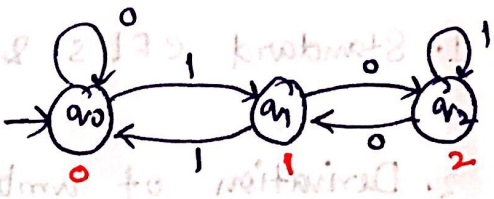
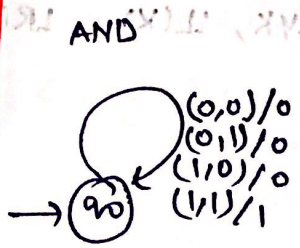
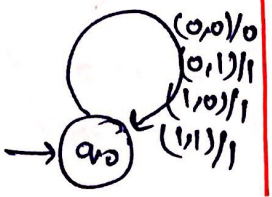
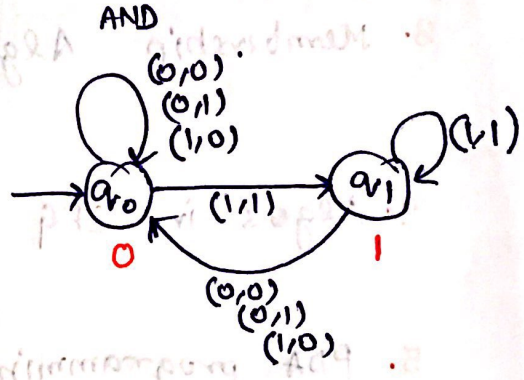
M-State, N-o/p Moore M/c ≡ (Mealy M/c ≤ m states)

⇒ Standard functions in Mealy & Moore :-

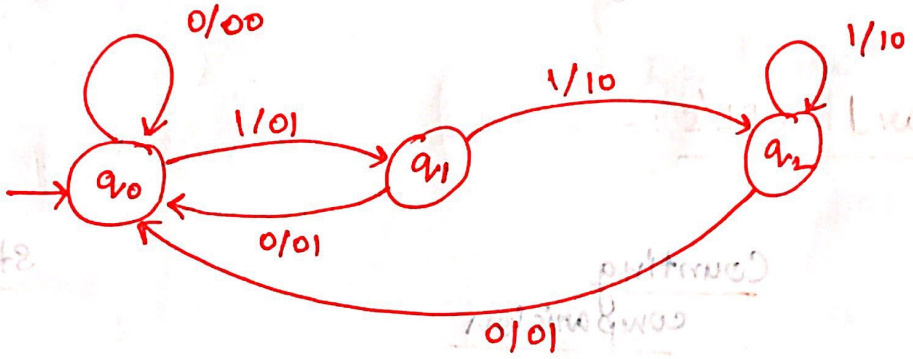
1. 1's compliment
2. 2's compliment
3. Binary Adder (Full)
4. Incremented by 1
5. Change the sign bit
6. Integer Division tester
7. Logical funct

Mealy M/c	Moore M/c
1's compliment 	

func^{n}	Mealy M/c	Moore M/c
2's complement		
Binary Full Adder		
Increment by 1	 	
change the sign bit	 	

func^n	Mealy M/c	Moore M/c
Integer divisible by Integer		$f(w) = d(w) \bmod 3$ 
Logical func^n	AND  OR 	AND 

Q.



(a) O/p is "00" for every 0

(b) O/p is "01" for every 1

(c) ✓ O/p is sum of present and previous bit of I/p.

(d) None of above.

Let take I/p = 10110 1 ⟶ 0 1 0 1 0 1 1 0 0 1 0 1

O/p = 0 1 0 1 0 1 1 0 0 1 0 1