

Course- BTech
Course Code- **CSET302**
Year- Third

Type- Core
Course Name- **Automata Theory & Computability**
Semester- Odd Batch- BTech 5th Semester

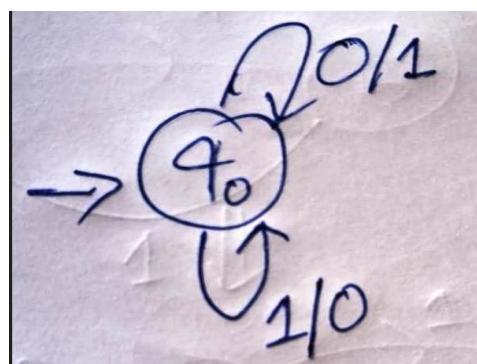
Tutorial-6

Tutorial No.	Name	CO1	CO2	CO3	CO4
6	DFA	✓	--	--	

Objective: Construction of Moore and Mealy machines and conversions.

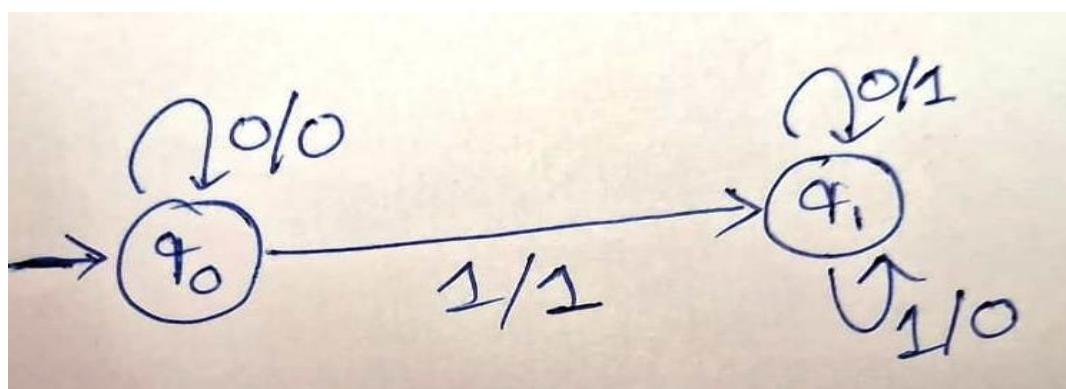
1. Construct a Mealy machine that represents 1's complement of a binary number. (CO1)

Sol.



2. Construct a Mealy Machine that represents 2's complement of a binary number. Assume that we are reading the string from L.S.B to M.S.B and end carry is discarded. (CO1)

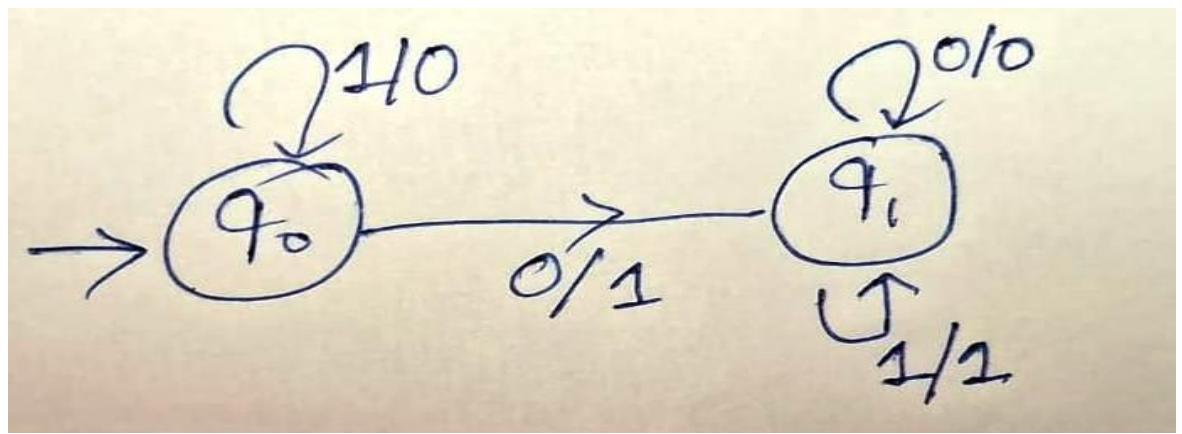
Sol.



Note that the output is printed in right to left order.

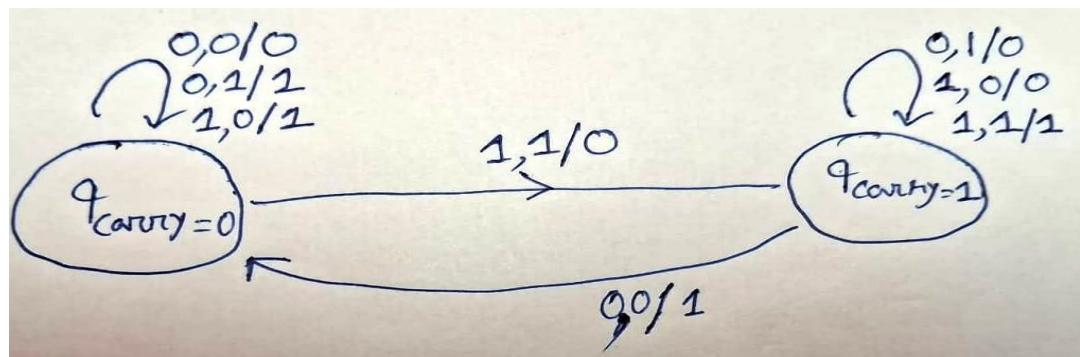
3. Design a Mealy Machine that represents the behavior of binary incrementation (it increments the given binary number by 1). Assume that we are reading the string from L.S.B to M.S.B and end carry is discarded. (CO1)

Sol.



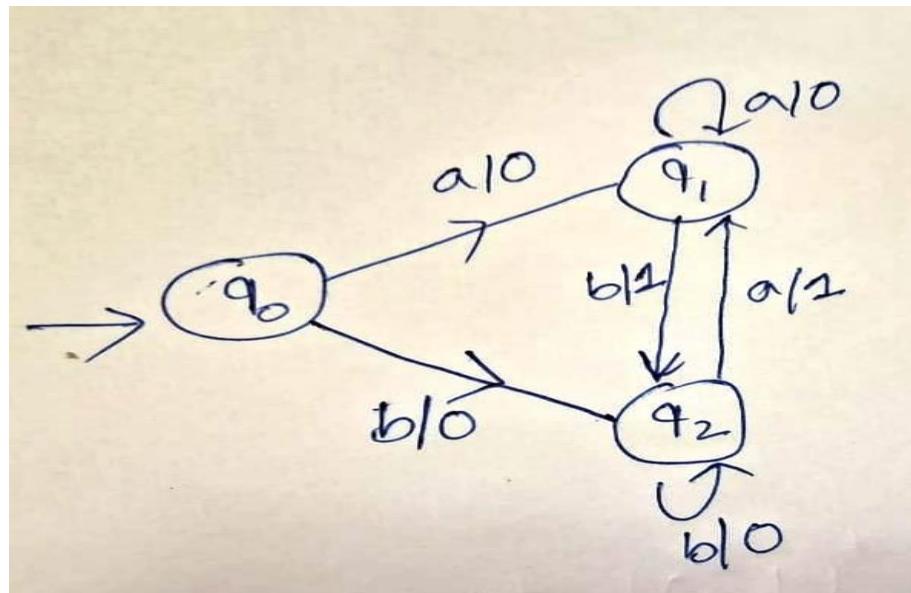
4. Construct the Mealy machine that represents the behavior of binary adder. (CO1)

Sol.



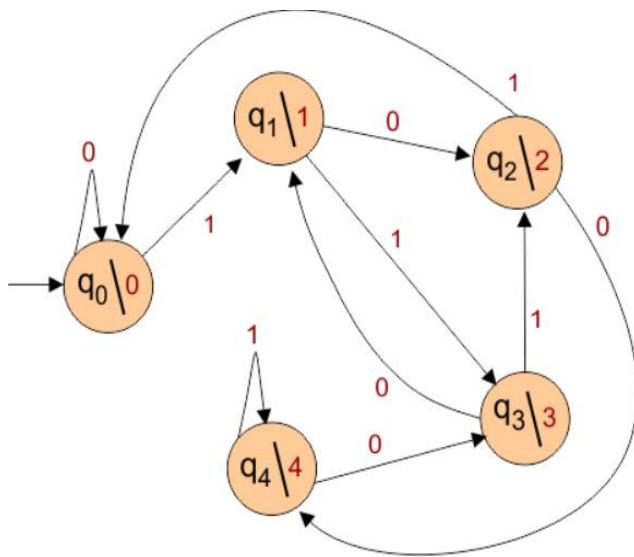
5. $\Sigma = \{a, b\}$. Construct the Mealy machine that represents the behavior as when the last two symbols of a string are different, it produces 1 as output. Otherwise, it produces 0 as output. (CO1)

Sol.

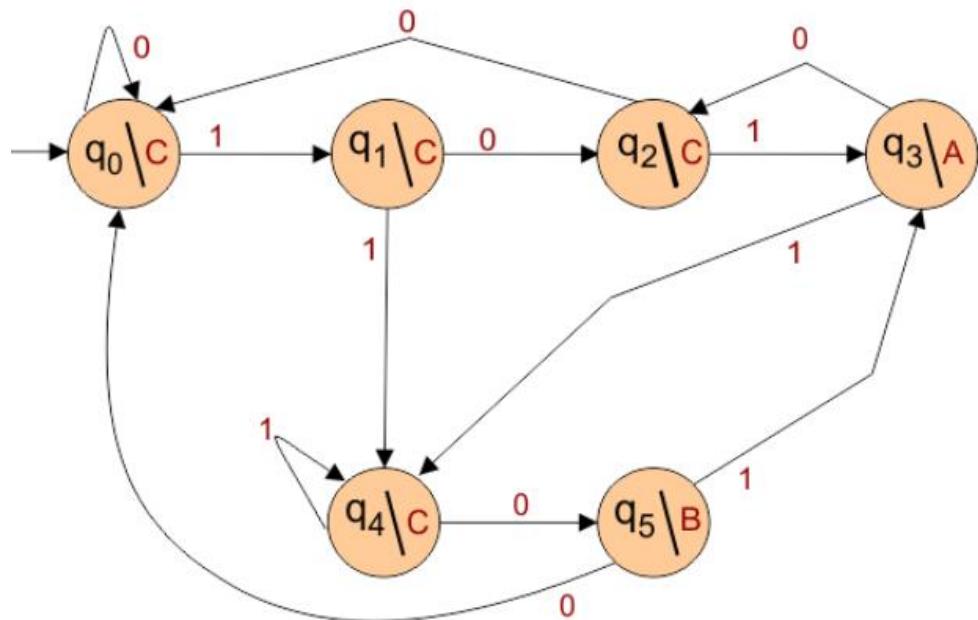


6. Construct the Moore machine that takes all binary numbers as input and produces residue modulo 5 as output. (CO1)

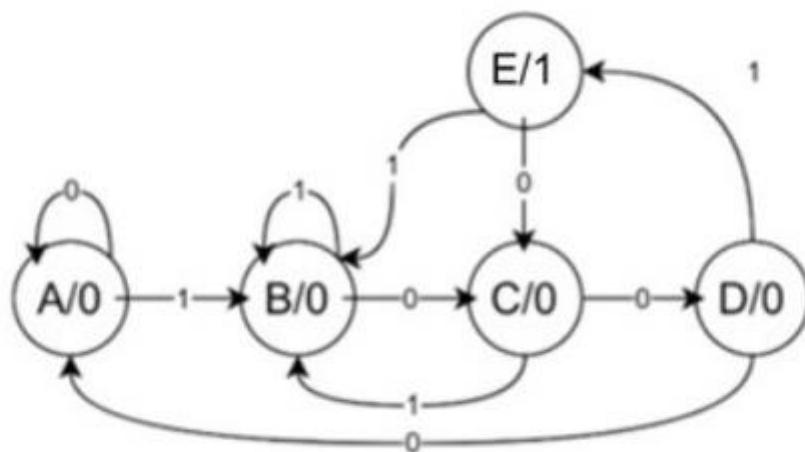
Sol.



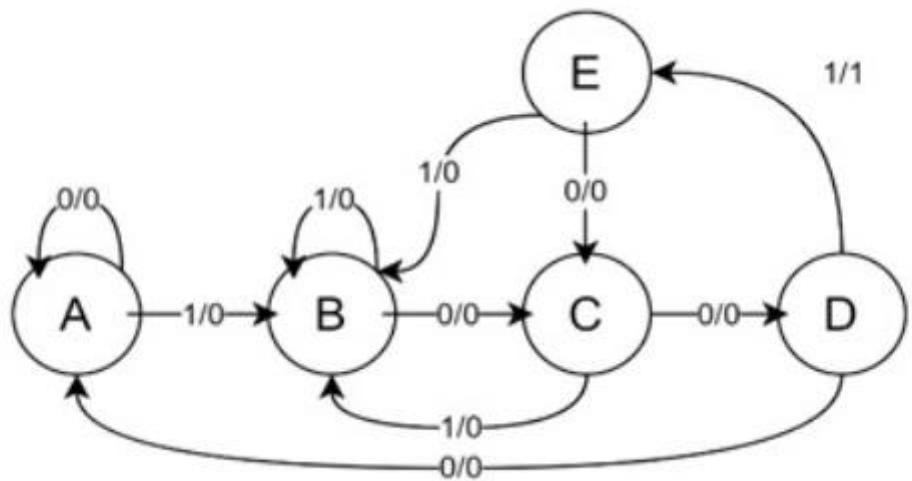
7. Design a Moore machine for a binary input sequence such that if it has a substring 101, the machine outputs A. If the input has a substring 110, its output is B. Otherwise, it outputs C. (CO1)
- Sol.**



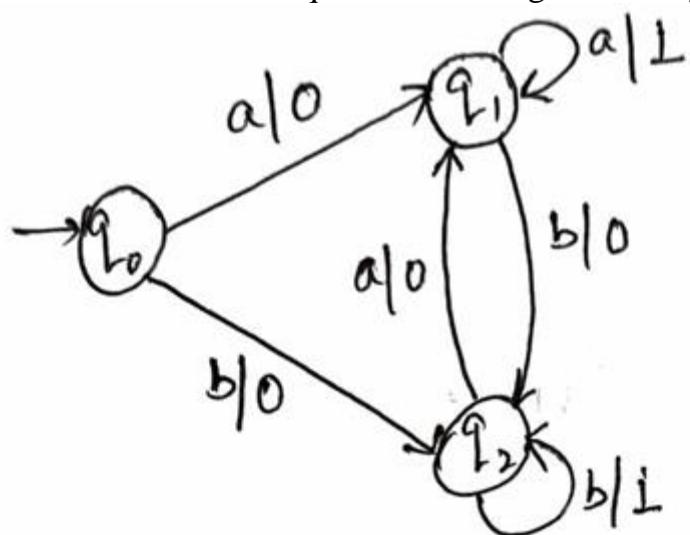
8. Construct the Mealy machine equivalent to the given Moore machine. (CO1)



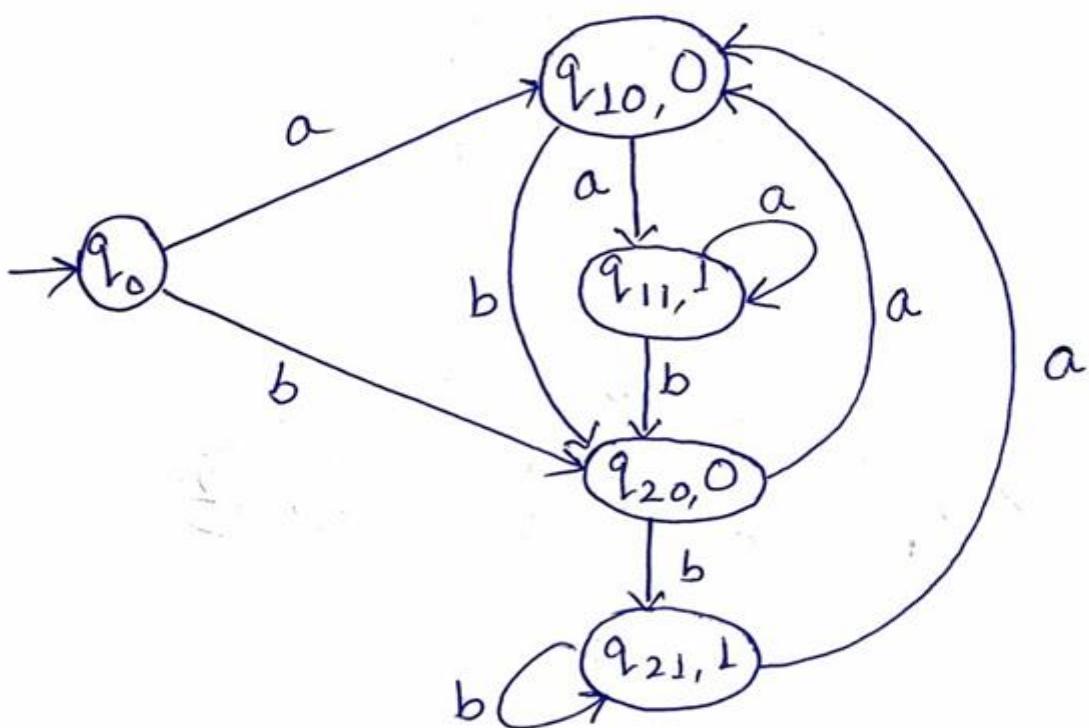
Sol.



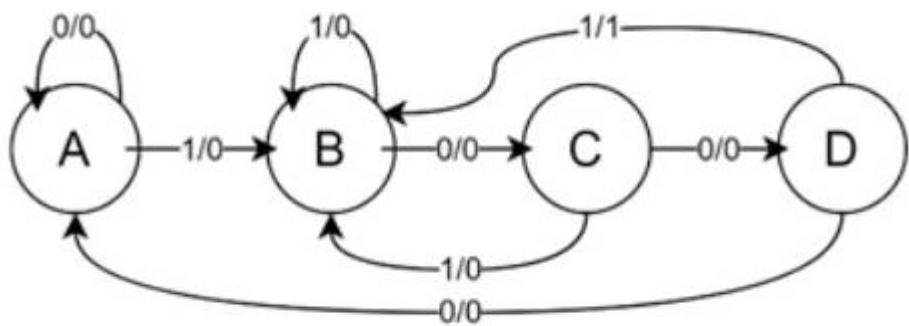
9. Construct the Moore machine equivalent to the given Mealy machine. (CO1)



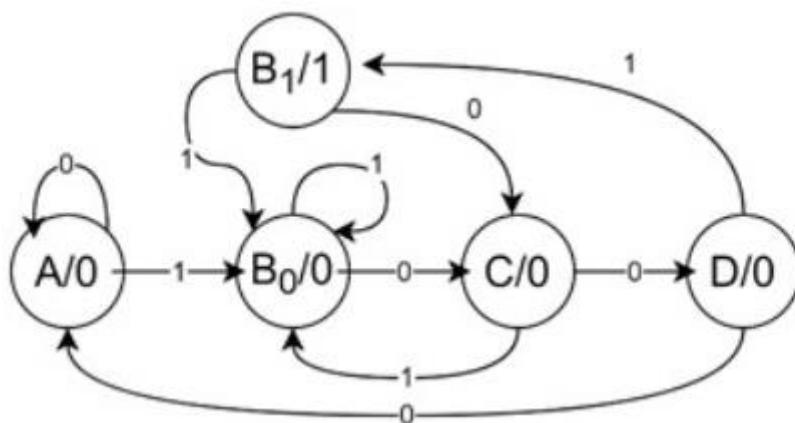
Sol.



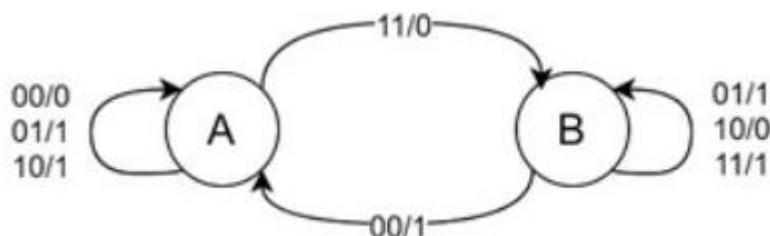
10. Construct the Moore machine equivalent to the given Mealy machine. (CO1)



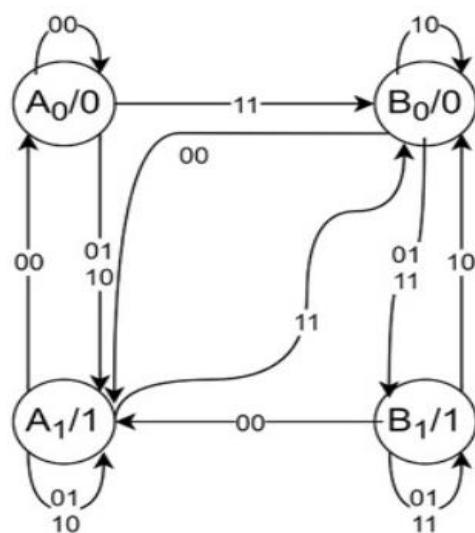
Sol.



11. Construct the Moore machine equivalent to the given Mealy machine. (CO1)



Sol.



12. Construct the transition table of Moore machine from the given transition table of Mealy Machine. **(CO1)**

States	$i = a$		$i = b$	
	N.S	Output	N.S	Output
q_0	q_3	0	q_2	1
q_1	q_2	0	q_0	1
q_2	q_1	1	q_3	1
q_3	q_0	1	q_1	1

Sol.

States	$i = a$	$i = b$	Output
q_0	q_{30}	q_{21}	1
q_1	q_{20}	q_0	1
q_{20}	q_1	q_{31}	0
q_{21}	q_1	q_{31}	1
q_{30}	q_0	q_1	0
q_{31}	q_0	q_1	1

13. If a Mealy machine has M states and the output alphabet has N symbols, then what is the maximum number of states possible in the equivalent Moore machine? **(CO1)**

Sol. $M \times N$