

MC304 Theory of Computation**Assignment-I**

1. Find a dfa that accepts all the strings on $\{0, 1\}$, except those containing the substring 001.
2. Construct a NDFA accepting the strings over $\{a, b\}$ ending in aba . Use it to construct a DFA accepting the same set of strings.
3. Construct a DFA for the NDFA represented by the transition diagram below:



4. Construct a Mealy machine which takes input $0, 1$ and can output EVEN, ODD according as the total number of 0's encountered is even or odd.
5. Construct a Moore machine equivalent to Mealy machine defined by table below:

Present State	Next State			
	a= 0		a= 1	
	State	Output	State	Output
$\rightarrow q_1$	q_1	1	q_2	0
q_2	q_4	1	q_4	1
q_3	q_2	1	q_3	1
q_4	q_3	0	q_1	1

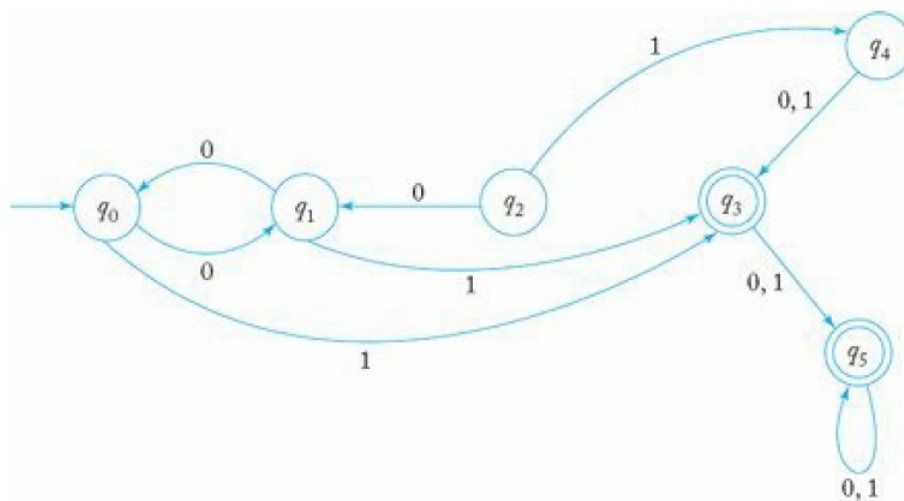
6. Construct a Mealy machine equivalent to Moore machine defined by table below:

Present State	Next State		Output
	a= 0	a= 1	
$\rightarrow q_0$	q_1	q_2	1
q_1	q_3	q_2	0
q_2	q_2	q_1	1
q_3	q_0	q_3	1

7. Construct a minimum state automata equivalent to automata given by the transition table below:

State	Input	
	a	b
$\rightarrow q_0$	q_0	q_3
q_1	q_2	q_5
q_2	q_3	q_4
q_3	q_0	q_5
q_4	q_0	q_6
q_5	q_1	q_4
$\textcircled{q_6}$	q_1	q_3

8. Construct a minimum automata for the automata below:



9. Consider making coffee using a plastic filter holder, a paper filter, a cup, some ground coffee, a teakettle, and a stove. The symbols of the alphabet represent possible actions:

a = light stove

b = boil water

c = pour one cup of water on filter

d = place filter in filter holder

e = place ground coffee in filter

f = place filter holder over cup

Most sequences of these actions will not result in a cup of coffee. But several will, there is more than one way to make coffee. Construct a finite automaton over this alphabet whose accepting states are those in which a good cup of coffee is produced and no mess. (For example, a mess could occur if I pour the water twice I might still get a good cup of coffee, and another one all over the counter.) This kind of problem arises in artificial intelligence, in robotics, and in the design of espresso machines.

10. Find and explain one real life application of a finite state automata.