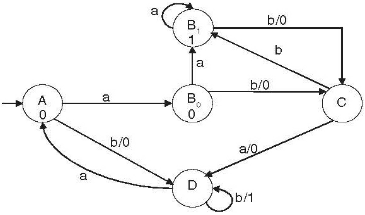
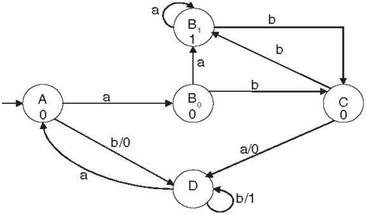
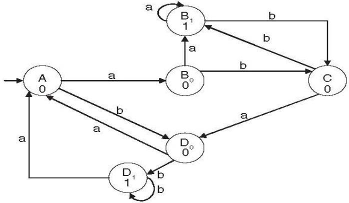


For the state A, the incoming edges to this state are from $B_{\{}0\}$ to C with label $b/0$ and $B_{\{}1\}$ to C with label $b/0$. There is no difference in the outputs of the incoming edges to this state, and so in the constructing Moore machine the output for this state will be 0.


a
B1
1
b
b
a
A
0
a
B0
0
b
C
0
b/0
a/0
a
D
b/1

For the state D, the incoming edges are A to D with label b/0, from C to D with label a/0, and from D to D with label b/1.

We get two different outputs for two incoming edges (D to D output 1, C to D output 0). So, the state D will be divided into two, namely, $D_{\{}0\}$ and $D_{\{}1\}$. The outgoing edges are duplicated for both the states generated from D. The modifi ed machine is



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21.Convert the following Mealy machine into an equivalent Moore machine.
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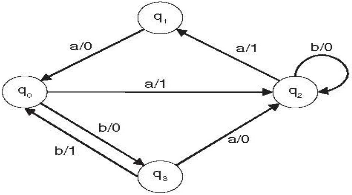
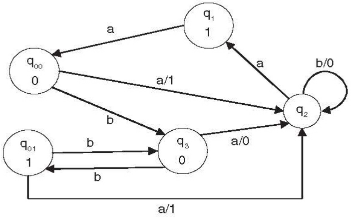
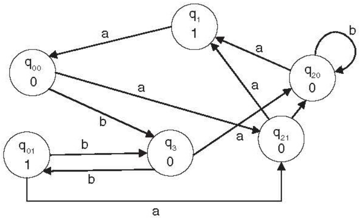
Solution: The state q_0 has two incoming edges: from q_1 with label a/0 and from q_3 with label $b/1$. As there is a difference in output, the state q_0 is divided into q_00 and q_01 with outputs 0 and 1, respectively. The states q_1 and q_3 have only one incoming edge each, and so there is no need of division. The state q_2 has three incoming edges; among those, two are of output '0' and another is of output '1'. Thus, it is divided into q_20 and q_21 with outputs 0 and 1, respectively.



From q_1 input with label 'a' ends on q_00, and from q_3 input with label 'b' ends on q_01. The outputs from old q_1 state are duplicated from q_00 and q_01.
The state q_1 and q_3 are not divided. q_1 gets output '1' and q_3 gets output '0'.
Dividing the state q_0 and placing q_1 and q_3, the intermediate machine becomes as follows



The state $q_2 4$ is divided into $q_2 0$ and $q_2 1$. From $q_0 0$ and $q_0 1$ input with label 'a' ends on $q_2 1$. From q_3 input with label 'a' ends on $q_2 0$. There is a loop on q_2. That loop will be on $q_2 0$ with label 'b'. Another transition with label 'b' is drawn from $q_2 1$ to $q_2 0$. The final Moore machine is as follows



22.Minimize the following finite automata.

		Next State	
	Present State	I/P = a	I/P = b
→	A	B	F
	B	A	F
	C	G	A
	D	H	B
	E	A	G
	F	H	C
	G	A	D
	H	A	C

Here F, G, and H are the final states.

Solution: In the finite automata, the states are $\{A, B, C, D, E, F, G, H\}$. Name this set as S_0.

$S_0 : \{A, B, C, D, E, F, G, H\}$

All of the states are 0 equivalents.

In the finite automata, there are two types of states: final state and non-final states. So, divide the set of states into two parts, Q1 and Q2.

$Q_1 = \{F, G, H\} Q_2 = \{A, B, C, D, E\}$

$S_1 : \{\{F, G, H\}\{A, B, C, D, E\}\}$

The states belonging to same subset are 1-equivalent because they are in the same set for string length 1. The states belonging to different subsets are 1-distinguishable.

The next states of F are H and C. The next states of G and H are A, D and A, C, respectively.

A, D and A, C belong to the same subset but H and C belong to a different subset. So, F, G, and H are divided into $\{F\}, \{G, H\}$.

For input 0, the next states of A, B, C, D, and E are B, A, G, H, and A, respectively. For input 1,the next states of A, B, C, D, and E are F, F, A, B, and G, respectively. So, the set $\{A, B, C, D, E\}$ is divided into $\{A, B, E\}$ and $\{C, D\}$.

$S_2 : \{\{F\}\{G, H\}\{A, B, E\}\{C, D\}\}$

By the same process, $\{A, B, E\}$ is divided into $\{A, B\}$, $\{E\}$.

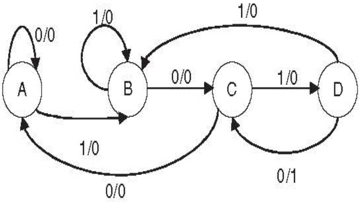
$S_3 : \{\{F\}\{G, H\}\{A, B\}\{E\}\{C, D\}\} = \{\{A, B\}, \{C, D\}, \{E\}, \{F\}, \{G, H\}\}$

The set is not dividable further. So, these are the states of minimized DFA. Let us rename the subsets as q_0, q_1, q_2, q_3, and q_4. The initial state was A, and so here the initial state is $\{A, B\}$, *i.e.*, q_0. The final state was F, G, and H, and so here the fi nal states are $\{F\}$, *i.e.*, q_3 and $\{G, H\}$, *i.e.*, q_4. The tabular representation of minimized *DFA* is

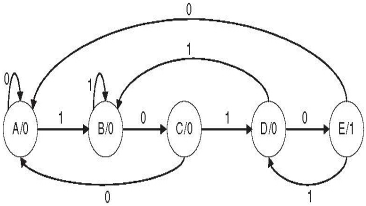
		Next State	
	Present State	I/P = 0	I/P = 1
$\rightarrow$	q_0	q_0	q_0
	q_0	q_0	q_0
	q_0	q_0	q_0
	q_0	q_0	q_0
	q_0	q_0	q_0

23.Design a Mealy and Moore machine for detecting a sequence 1010 where overlapping sequences are also accepted. Convert the Moore machine that you have got into a Mealy machine. Are there any differences? How will you prove that the two Mealy machines are equivalent?

Solution: The Mealy machine is



The Moore machine is



The converted Mealy machine from the given Moore machine is (by using the transactional format)