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	$I/P=0$		$I/P=1$	
PresentState	*NextState*	O/P	*NextState*	O/P
$q_2 0$	$q_1 1$	1	$q_2 1$	1
$q_2 1$	$q_1 1$	1	$q_2 1$	1
q_3	$q_2 0$	1	q_0	1

The converted Moore machine is

	NextState		
State	$I/P=0$	$I/P=1$	O/P
$\rightarrow q_0$	q_0	$q_1 0$	1
$q_1 0$	q_3	q_3	0
$q_1 1$	q_3	q_3	1
$q_2 0$	$q_1 1$	$q_2 1$	0
$q_2 1$	$q_1 1$	$q_2 1$	1
q_3	$q_2 0$	q_0	1

To get rid of the problem of occurrence of a null string, we need to include another state, q_a, with the same transactions as that of q0 but with output 0.

The modified final Moore machine equivalent to the given Mealy machine is

	NextState		
State	$I/P = 0$	$I/P = 1$	O/P
$\rightarrow q_a$	q_0	$q_1 0$	0
q_0	q_0	$q_1 0$	1
$q_1 0$	q_3	q_3	0
$q_1 1$	q_3	q_3	1
$q_2 0$	$q_1 1$	$q_2 1$	0
$q_2 1$	$q_1 1$	$q_2 1$	1
q_3	$q_2 0$	q_0	1

17. Convert the following Mealy Machine to a Moore Machine. [WBUT 2008]

	Next State $I/P = 0$		Next State $I/P = 1$	
PresentState	State	Output	State	Output
Q_1	q_2	1	q_1	0
Q_2	q_3	0	q_4	1
Q_3	q_1	0	q_4	0
Q_4	q_3	1	q_2	1

Solution: Q_3 and $_4$ as next states produce outputs 0 and 1, and so the states are divided into Q_30, Q_31 and Q_40, Q_41. Thus, the constructing Moore machine contains six states. The Moore machine becomes

	NextState		
State	$I/P = 0$	$I/P = 1$	*Output*
Q_1	Q_2	Q_1	0
Q_2	Q_30	Q_41	1
Q_30	Q_1	Q_40	0
Q_31	Q_1	Q_40	1
Q_40	Q_31	Q_2	0
Q_41	Q_31	Q_2	1

18. From the following Mealy machine, find the equivalent Moore machine. Check whether the Mealy machine is a minimal one or not. Give proper justification to your answer. [WBUT 2007]

	$I/P = 0$		$I/P = 1$	
PresentState	*NextState*	*O/P*	*NextState*	*O/P*
S_1	S_2	0	S_1	0
S_2	S_2	0	S_3	0
S_3	S_4	0	S_1	0
S_4	S_2	0	S_5	0
S_5	S_2	0	S_1	1

Solution:

i) In the Mealy machine, S_1 as the next state produces output 0 for some cases and produces output 1 for one case. For this reason, the state S_1 is divided into two parts: S_10 and S_11. All the other states produce output 0.

To get rid of the problem of occurrence of a null string, we need to include another state, S_a, with the same transactions as that of S_10 but with output 0.

The modified final Moore machine equivalent to the given Mealy machine will be as follows.

The converted Moore machine is

	NextState		
State	$I/P = 0$	$I/P = 1$	*Output*
S_a	S_2	S_10	0
S_10	S_2	S_10	0
S_11	S_2	S_10	1
S_2	S_2	S_3	0
S_3	S_4	S_10	0
S_4	S_2	S_5	0
S_5	S_2	S_11	0

ii) All the states are 0 equivalents.

$$P_0 = \{S_1 S_2 S_3 S_4 S_5\}$$

For string length 1, all the states produce output 0 except S_5.

$$P_1 = \{S_1 S_2 S_3 S_4\}\{S_5\}$$

The next states of all the states (belong to the first subset) for all inputs belong to one set except S_4. The modified partition is

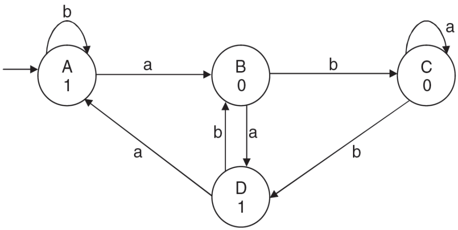
$$P_2 = \{S_1 S_2 S_3\}\{S4\}\{S5\}$$

By this process, $P_3 = \{S1S2\}\{S3\}\{S4\}\{S5\}$

$$P_4 = \{S_1\}\{S_2\}\{S_3\}\{S_4\}\{S_5\}$$

The machine is a reduced machine as the number of subsets of the machine is the same as the number of states of the original Mealy machine. Hence, the machine is a minimal machine.

19. Convert the following Moore machine into an equivalent Mealy machine by the transitional format.



Solution:

i) In this machine, A is the beginning state. So start from A. For A, there are three incoming arcs, from A to A with input b, one in the form of start-state indication with no input, and the last is from D to A with input a. State A is labelled with output 1. As the start-state indication contains no input, it is useless and, therefore, keep it as it is.

Modify the label of the incoming edge from D to A and from A to A including the output of state A. So, the label of the incoming state will be D to A with label a/1 and A to A with label b/1.

ii) State B is labelled with output 0. The incoming edges to the state B are from A to B with input a and from D to B with input b.

Modify the labels of the incoming edges including the output of state B. So, the labels of the incoming states will be A to B with label a/0 and from D to B with label b/0.

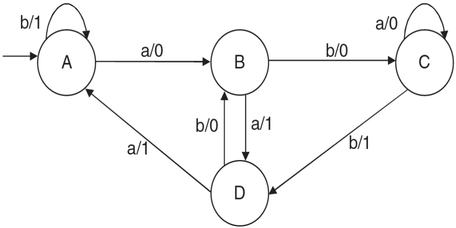
iii) State C is labelled with output 0. There are two incoming edges to this state, from B to C with input b and from C to C with input a.

The modified label will be B to C with label b/0 and C to C with label a/0.

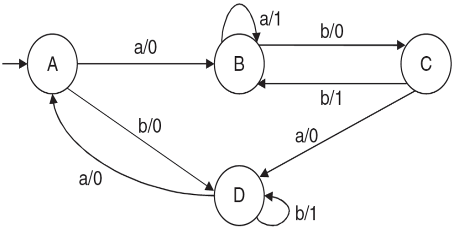
iv) State D is labelled with output 1. There are two incoming edges to this state, from B to D with input a and from C to D with input b.

The modified label will be B to D with label a/1, and C to D with label b/1.

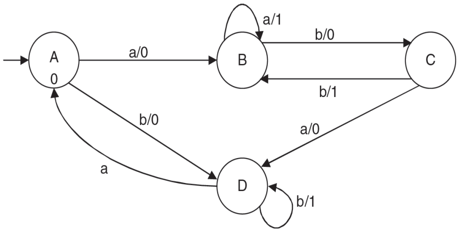
The converted Mealy machine will be



20. Convert the following Mealy machine into an equivalent Moore machine by the transitional format.



Solution: The machine contains four states. Let us start from the state A. The incoming edges to this state are from D to A with label a/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.



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

We get two different outputs for two incoming edges (B to B output 1, A to B output 0). So, the state B will be divided into two, namely, B0 and B1. The outgoing edges are duplicated for both the states generated from B. The modified machine is