	$I/P = 0$		$I/P = 1$	
$Present State$	$Next State$	O/P	$Next State$	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

	$Next State$		
$State$	$I/P = 0$	$I/P = 1$	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

	$Next State$		
$State$	$I/P = 0$	$I/P = 1$	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 $I/P = 1$	
$Present State$	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: $S_1 0$ and $S_1 1$. 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 $S_1 0$ 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	$S_1 0$	0
$S_1 0$	S_2	$S_1 0$	0
$S_1 1$	S_2	$S_1 0$	1
S_2	S_2	S_3	0
S_3	S_4	$S_1 0$	0
S_4	S_2	S_5	0
S_5	S_2	$S_1 1$	0

ii) All the states are 0 equivalents.

$$P_0 = \{S_1S_2S_3S_4S_5\}$$

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

$$P_1 = \{S_1S_2S_3S_4\}\{S_5\}$$

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

$$P_2 = \{S_1S_2S_3\}\{S4\}\{S5\}$$

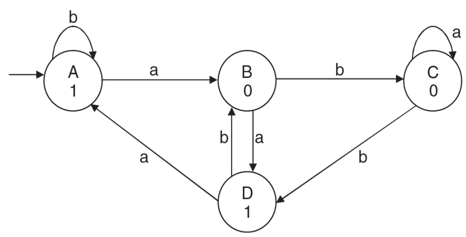
By this process, $P_3 = \{S1S2\}\{S3\}\{S4\}\{S5\}$

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

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.

1 picture



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.

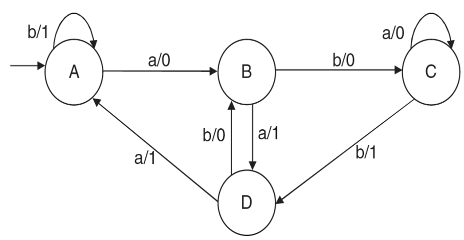
The modified label will be B to C with label b/0 and C to C with label a/0.

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.

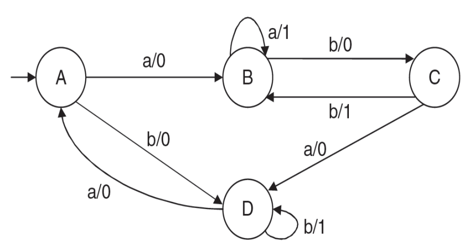
The converted Mealy machine will be

2 picture



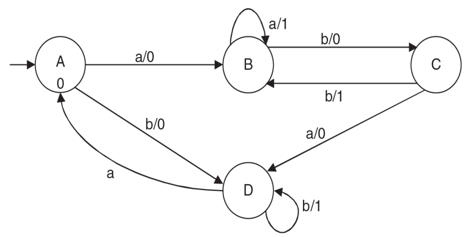
20. Convert the following Mealy machine into an equivalent Moore machine by the transitional format.

3 picture



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.

4 picture



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