Problem 3. *A sequential circuit has one flip-flop, Q ; two inputs, x and y; one output, S. It consists of a full-adder circuit connected to a D flip-flop, as shown in Fig. 4.153(a). Derive the state table and state diagram of the sequential circuit.*

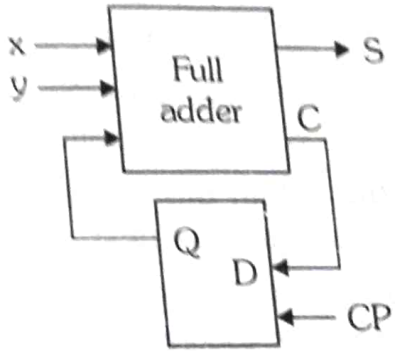

Fig. 4.153(a)

Solution. It has only one flip-flop; two inputs and one output. The state table for the above circuit is shown in Table 4.63.

Table 4.63. State table

Present state	*Inputs*		Next state	Output
Q	x	y	D = C	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

The state diagram is shown in Fig. 4.153(*b*).

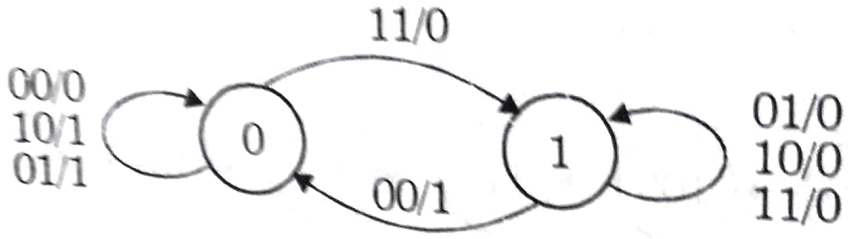

Fig. 4.153(*b*)