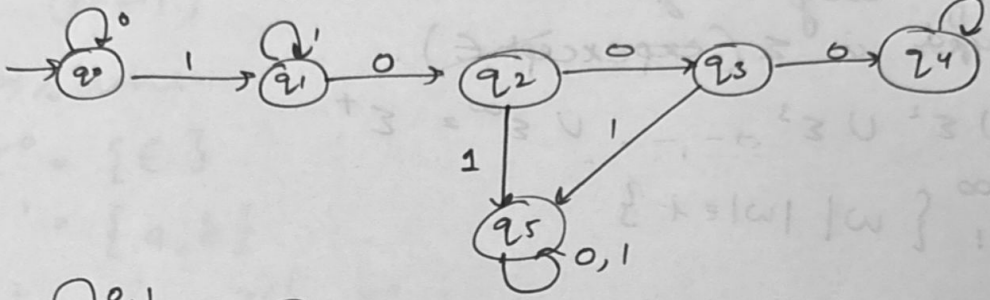
Z3010103S0

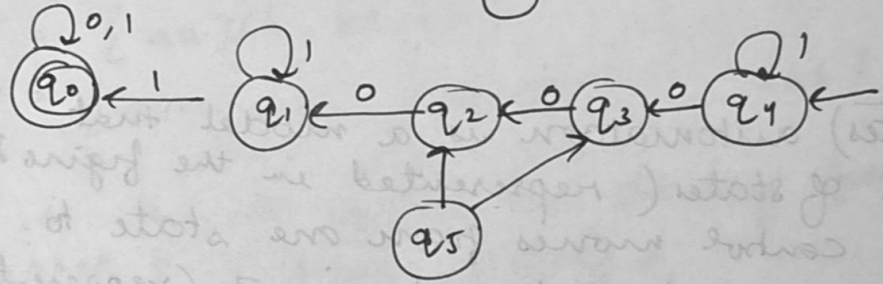
Assignment - 01

Ques) a) $L = \{ w \mid w \in \{0,1\}, 4^{th}$ symbol from beginning of w is 0 $\}$

$L = \{ 1010, 1000, 1110 - \text{---} \}$

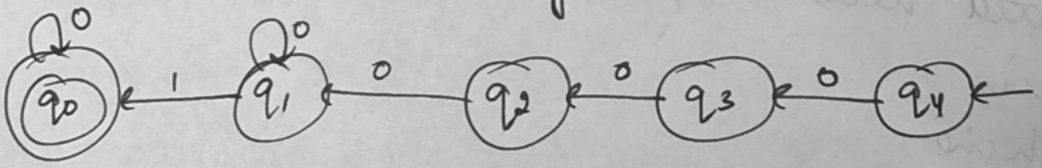


b)



c) Yes, it is valid in finite automation cause it has both final & initial state. It is NFA because in NFA, there is more than 1 transition for input & in DFA there is only one transition from each input.

d) minimize → q5 is unreachable since it has no incoming edge, the new diagram -



Ques 2): $|w| \geq 4$

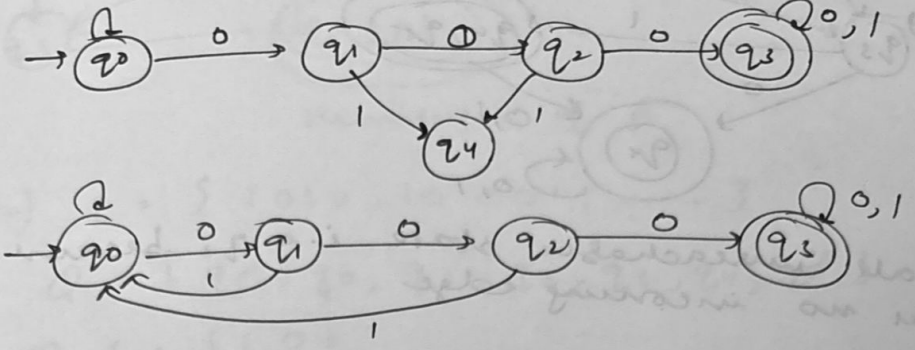
begins with → 0 1

~~with~~ ends with → 1 0

Ques 5) contain "000" as a substring

$\Sigma = \{0, 1\}$

$L = \{ 1000, 0001, 1000 \text{ ---} \}$

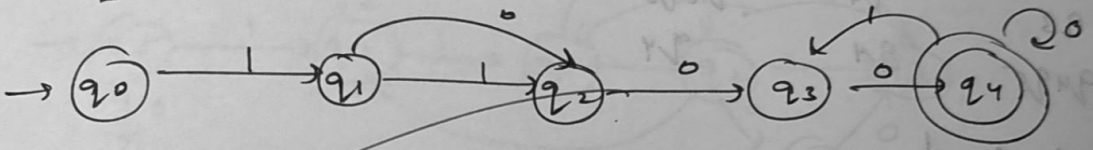


Ques 6:) $\Sigma = \{0, 1\}$

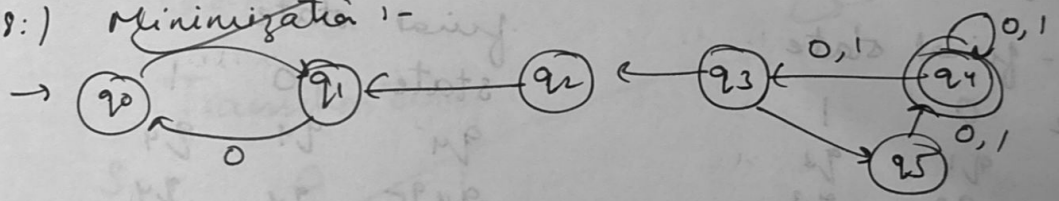
⇒ even no. of zero

⇒ even no of ones

$L = \{ 0011, 1100, 11110000 \text{ ---} \}$



Ques 8:) Minimization :-

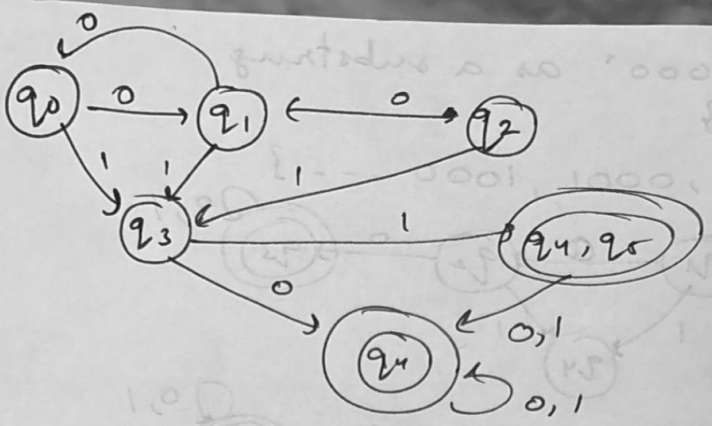


Transition table :-

State	0	1
q_0	q_1	q_3
q_1	q_0	q_3
q_2	q_1	q_3
q_3	q_1	$q_4 q_5$
q_5	q_4	q_4

DFA transition table :-

State	0	1
q_0	q_1	q_3
q_1	q_0	q_3
q_2	q_1	$q_4 q_5$
q_3	q_4	q_4
q_4	q_4	q_4
$q_4 \cdot q_5$		



Remove all unreachable state i.e q_2 because there is no incoming edge

state	0	1
q_0	q_1	q_3
q_1	q_0	q_3
q_4	q_4	q_4
q_3	q_4	q_4q_5
q_4q_5	q_4	q_4

minimized

non-final state

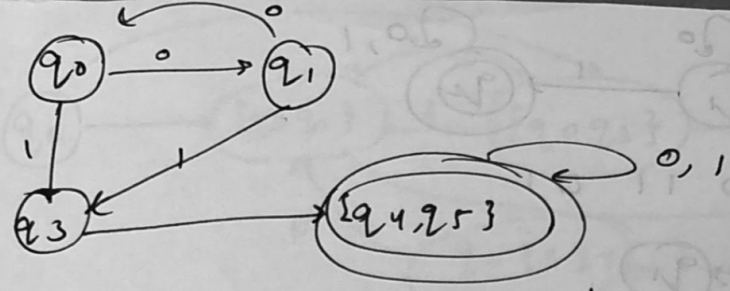
state	0	1
q_0	q_1	q_3
q_1	q_0	q_3
q_3	q_4	q_4q_5

final state

state	0	1
q_4	q_4	q_4
q_4q_5	q_4	q_4

now we will remove the duplicate rows and merge them into one and once again both the tables

state	0	1
q_0	q_1	q_3
q_1	q_0	q_3
q_3	q_4q_5	q_4q_5
q_4q_5	q_4q_5	q_4q_5



minimized of A

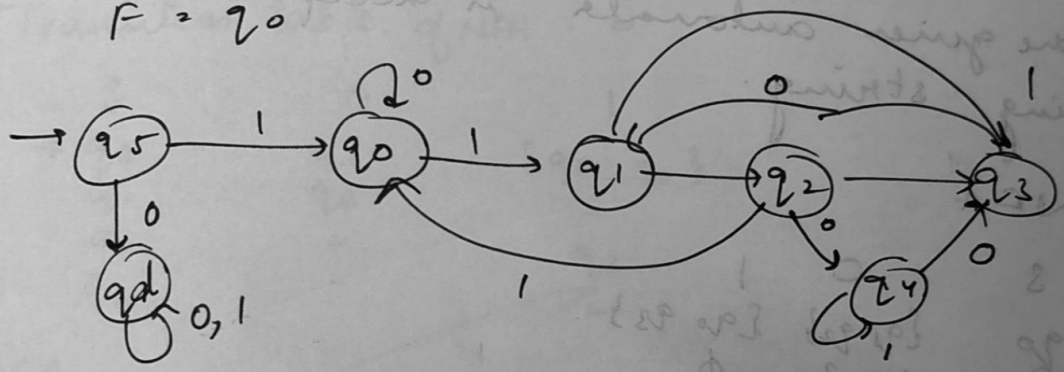
Ques 14:-) $L = \{1010, 101001, \dots\}$

$Q = \{q5, q0, q1, q2, q3, q4, qd\}$

$\Sigma = \{1, 0\}$

$q0 = q0$

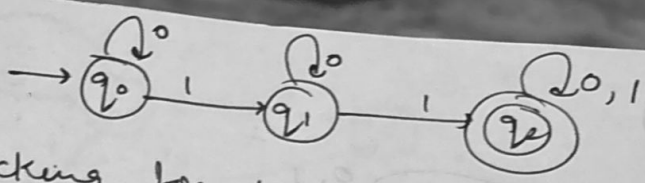
$F = q0$



Transition table

S	0	1
q5	qd	q0
q0	q0	q1
q1	q2	q3
q2	q4	q0
q3	q1	q4
q4	q3	qd
qd	qd	qd

Ans 19):-



checking for 10 11 01

for 1 $q_0 \xrightarrow{1} q_1$

for 0 $q_1 \xrightarrow{0} q_1$

for 1 $q_1 \xrightarrow{1} q_2$

for 1 $q_2 \xrightarrow{1} q_2$

for 0 $q_2 \xrightarrow{0} q_2$

for 1 $q_2 \xrightarrow{1} q_2$

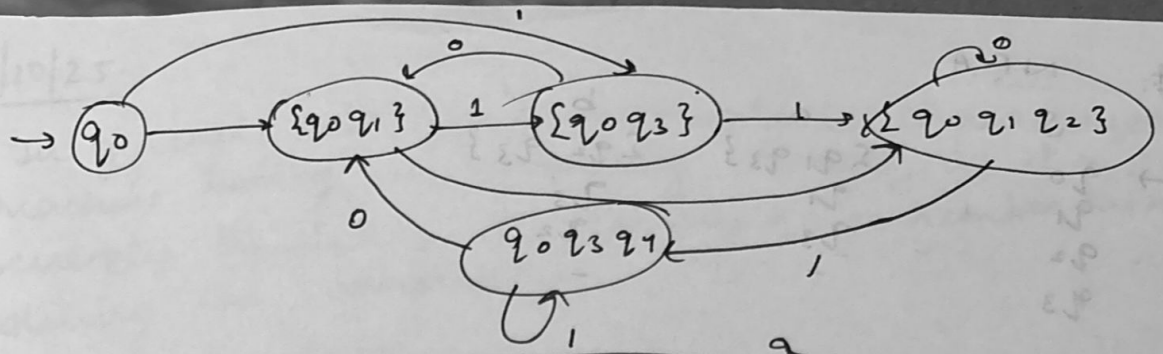
Hence, the given automata is acceptable for a giving string.

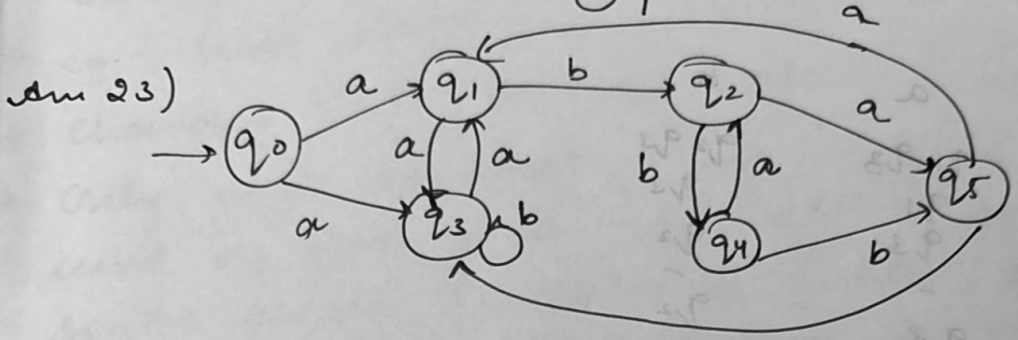
Ans 20). NFA

S	0	1
q_0	$\{q_1, q_2\}$	$\{q_0, q_3\}$
q_1	$\{q_1\}$	ϕ
q_2	ϕ	ϕ
q_3	ϕ	$\{q_4\}$
q_4	ϕ	ϕ

DFA

S	0	1
q_0	q_0q_1	q_0q_3
$\{q_0, q_3\}$	$q_0q_1q_2$	q_0q_3
$\{q_0, q_3\}$	q_0q_1	$q_0q_3q_4$
$\{q_0q_1q_2\}$	$q_0q_1q_2$	q_0q_3
$\{q_0, q_3, q_4\}$	q_0q_1	$q_0q_3q_4$



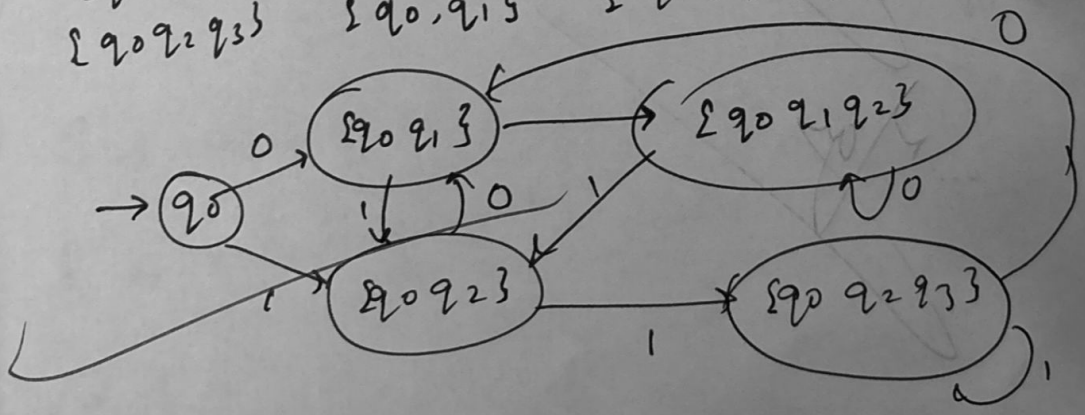


Transition table of NFA

S	0	1
→ q_0	q_1	$\{q_0, q_1\}$
q_1	q_2	-
q_2	-	q_3
q_3	-	-

DFA

S	0	1
→ q_0	$\{q_0, q_1\}$	$\{q_0, q_2\}$
$\{q_0, q_1\}$	$\{q_0 q_1 q_3\}$	$\{q_0, q_2\}$
$\{q_0 q_2\}$	$\{q_0 q_1\}$	$\{q_0, q_2, q_3\}$
$\{q_0 q_1 q_3\}$	$\{q_0 q_1 q_3\}$	$\{q_0, q_2\}$
$\{q_0 q_2 q_3\}$	$\{q_0, q_1\}$	$\{q_0, q_2, q_3\}$



Ans 24. NFA

	S	a	b
→	q_0	$\{q_1, q_3\}$	$\{q_2, q_3\}$
	q_1	q_1	q_3
	q_2	q_3	q_2
	q_3	-	-

DFA table

S	a	b
q_0	$q_1 q_3$	$q_2 q_3$
$\{q_1, q_3\}$	q_1	q_3
$\{q_2, q_3\}$	q_3	q_2
q_3	-	-
q_2	q_3	q_2
q_1	q_1	q_3