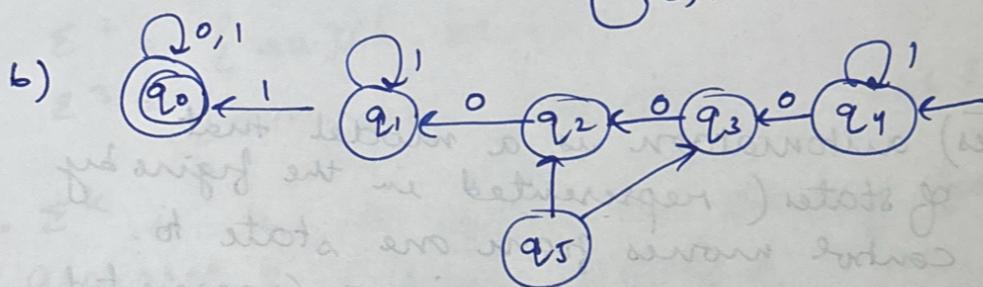
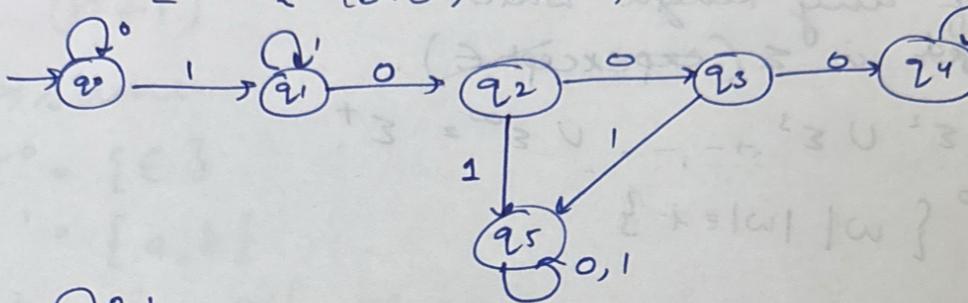


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Assignment - 01

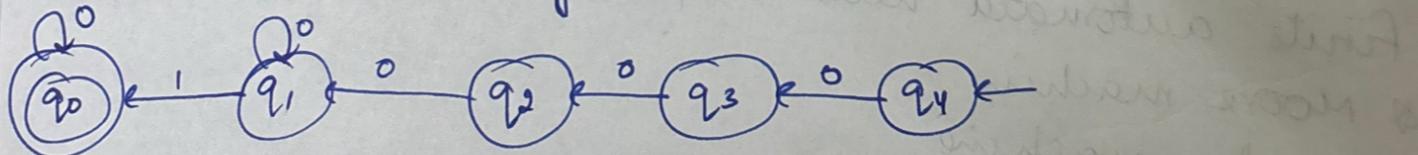
Ques 1) a) $L = \{ w \mid w \in \{0,1\}^*, 4^{\text{th}} \text{ symbol from beginning of } w \text{ is } 0 \}$

$$L = \{ 1010, 1000, 1110, \dots \}$$



Yes, it is valid in finite automaton 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.

c) minimize $\rightarrow q_5$ is unreachable since it has no incoming edge, the new diagram -



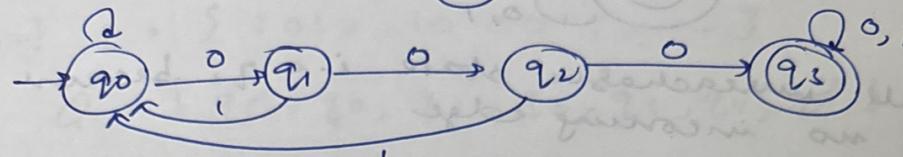
Ques 2: $|w| \geq 4$

begin with $\rightarrow 01$
will ends with $\rightarrow 10$

Ques 5) contains "000" as a substring

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

$$L = \{1000, 0001, 1000 \dots\}$$

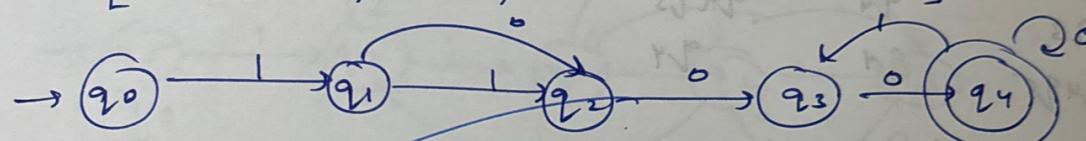


Ques 6:) $\Sigma = \{0, 1\}$

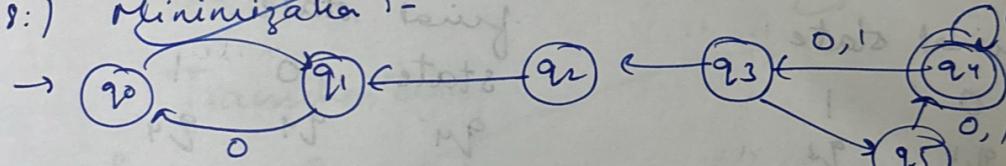
→ even no. of zero

→ even no. of ones

$$L = \{0011, 1100, 11110000 \dots\}$$



Ques 8:) Minimization :-

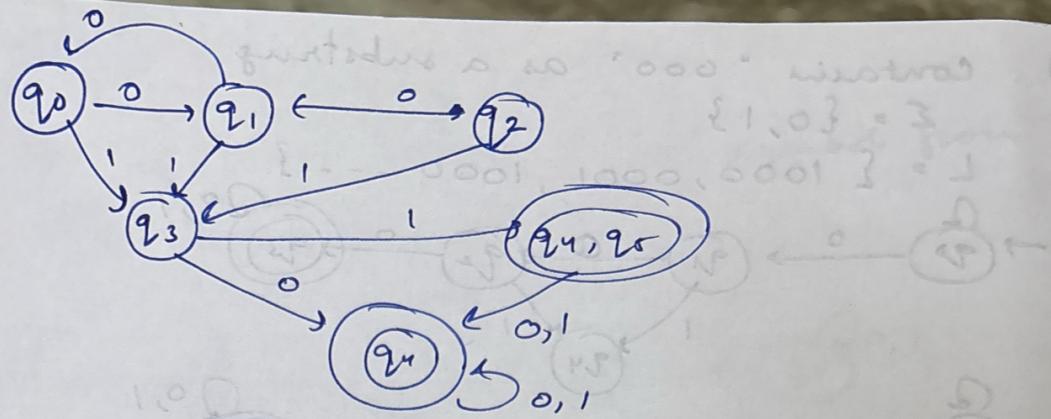


Transition table :-

State	0	1
q0	q1	q2
q1	q0	q3
q2	q1	q3
q3	q1	q4, q5
q4	q4	q4

DFA transition table :-

State	0	1
q0	q1	q3
q1	q0	q3
q2	q1	q4, q5
q3	q4	q4
q4	q4	q4
q4, q5		q1



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_4, q_5
q_4, q_5	q_4	q_4

minimized

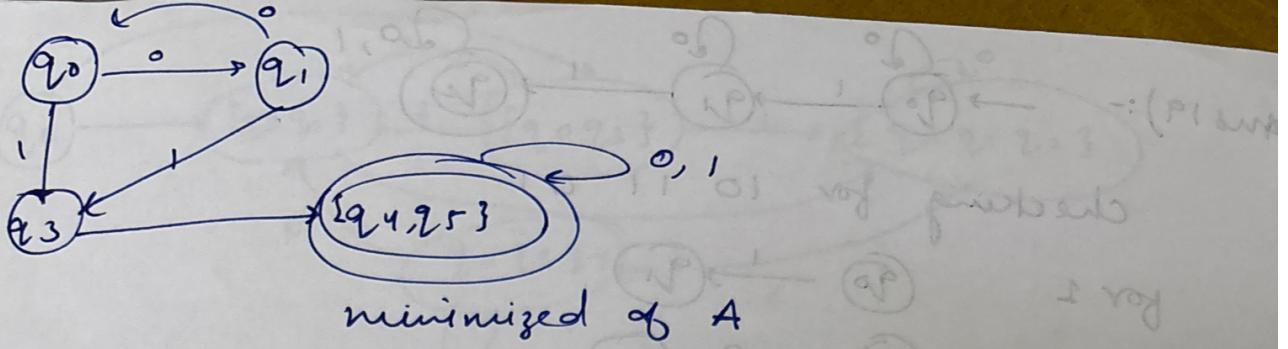
non-final state	state	0	1
q_0	q_1	q_3	
q_1	q_0	q_3	
q_3	q_4	q_4, q_5	

final state

state	0	1
q_4	q_4	q_4
q_4, q_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_4, q_5	q_4, q_5
q_4, q_5	q_4, q_5	q_4, q_5



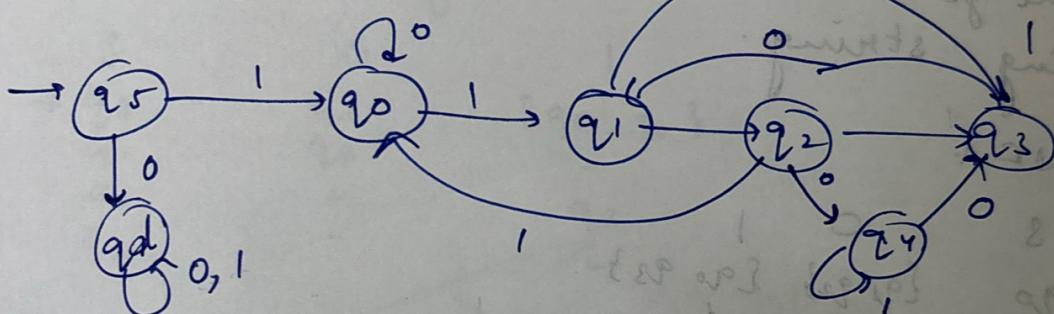
Ques 14:-) $L = \{1010, 101001, \dots\}$

$$Q = \{q_5, q_0, q_1, q_2, q_3, q_4, q_d\}$$

$$\alpha \in \{1, 0\}$$

$$q_0 = \text{start}$$

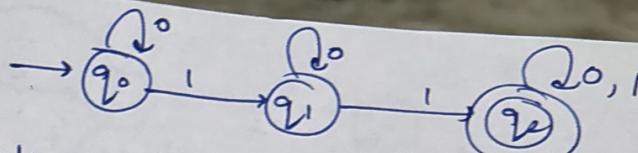
$$F = q_0$$



Transition table

S	0	1
q_5	q_d	
q_0	q_0	q_1
q_1	q_2	q_3
q_2	q_4	q_0
q_3	q_1	q_2
q_4	q_3	q_4
q_d	q_d	q_d

Ans 19) :-



Checking for 10 11 01

for 1

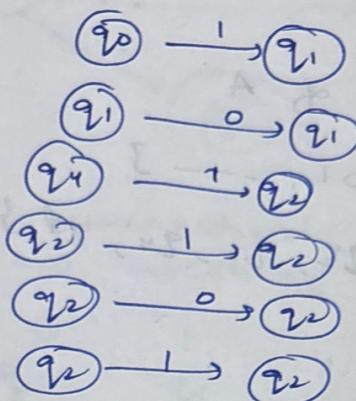
for o

for 1

for 1

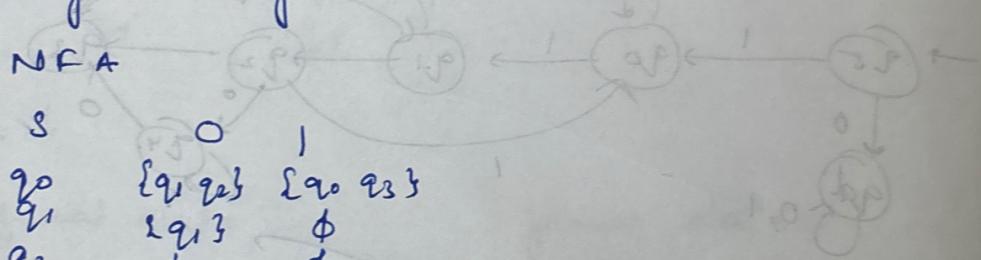
for o

for 1



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

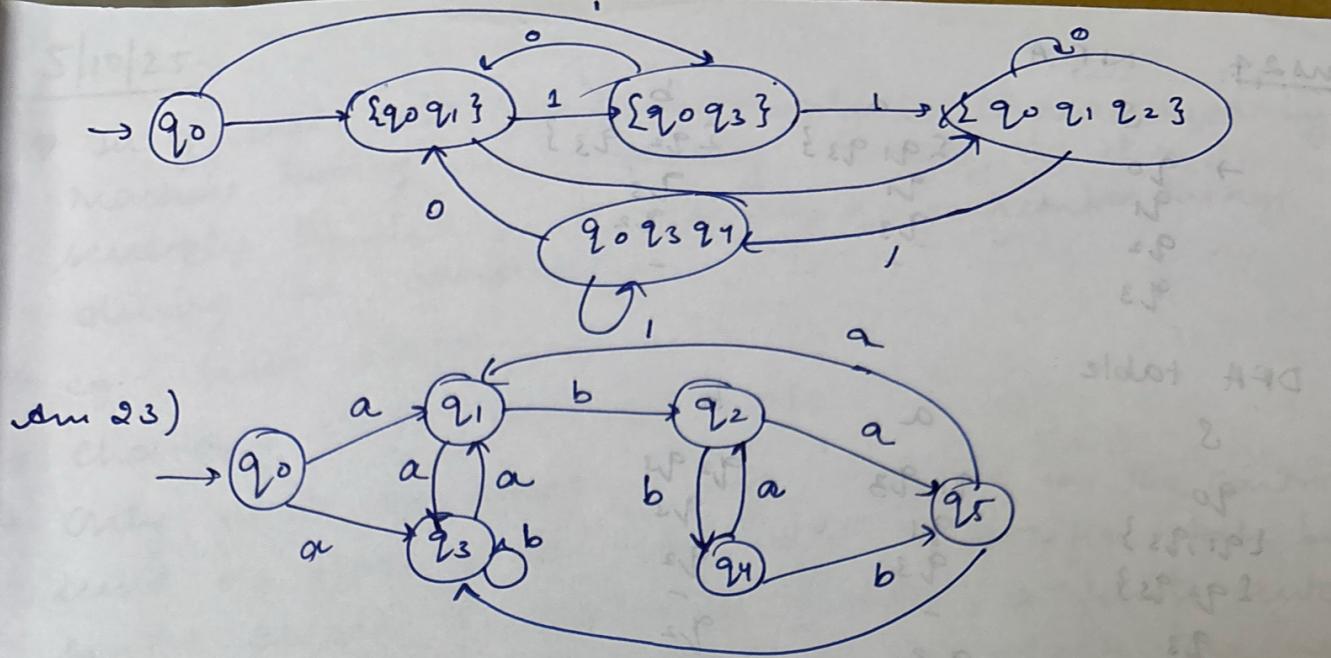
Ans 20). NFA



s	o	i
g_0	$\{g_1, g_2\}$	$\{g_0, g_3\}$
g_1	$\{g_1\}$	\emptyset
g_2	\emptyset	\emptyset
g_3	\emptyset	$\{g_4\}$
g_4	\emptyset	\emptyset

DFA

S	O	I
90	9091	9093
{90, 93}	909192	9093
{90, 93}	9091	909394
{909192}	909192	9093
{90, 93, 94}	9091	909394

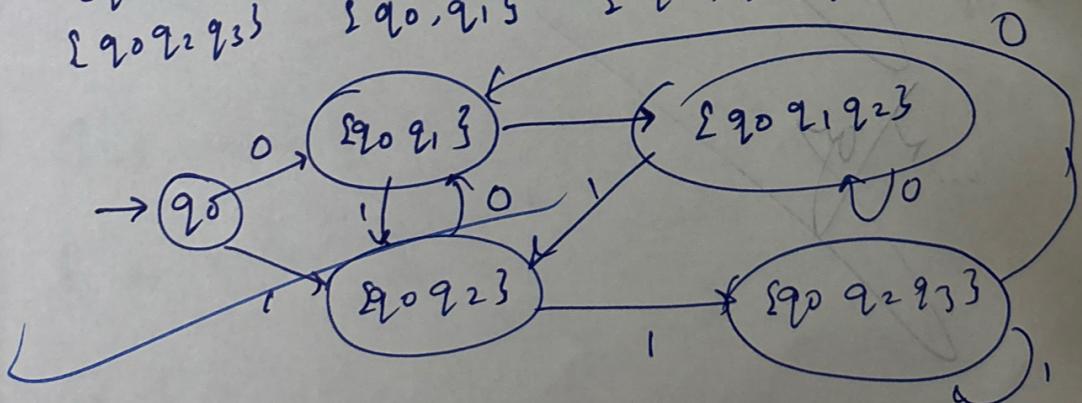


Transition table of NFA b

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

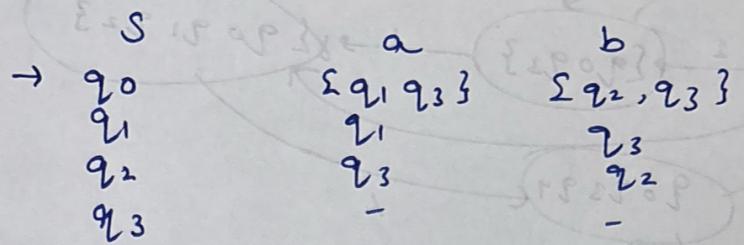
DFA

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



Ans 2.4.

NFA



DFA table

s	a	b	d	$\{NP\}$
q_0	$\{q_1, q_3\}$	$\{q_2, q_3\}$	$\{q_2, q_3\}$	$\{NP\}$
$\{q_1, q_3\}$	$\{q_1\}$	$\{q_3\}$	$\{q_2\}$	$\{NP\}$
$\{q_2, q_3\}$	$\{-\}$	$\{q_2\}$	$\{q_3\}$	$\{NP\}$
q_3	$\{q_3\}$	$\{-\}$	$\{q_3\}$	$\{NP\}$
q_2	$\{q_3\}$	$\{q_3\}$	$\{q_3\}$	$\{NP\}$
q_1	$\{q_1\}$	$\{q_1\}$	$\{q_1\}$	$\{NP\}$

