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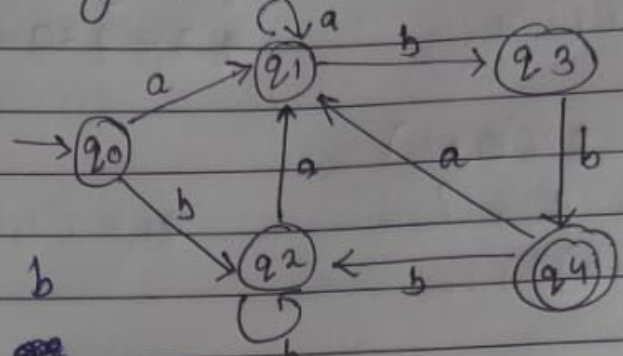
Assignment 2

Ques 1 Minimize the given DFA.



	a	b
→q0	q1	q2
q1	q1	q3
q2	q1	q2
q3	q1	q4
q4	q1	q2

$\pi_0 = (\{q0, q1, q2, q3\}, \{q4\})$

$\pi_0 = (\{q4\}, \{q0, q1, q2, q3\})$

$\pi_1 = (\{q4\}, \{q0, q1, q2\}, \{q3\})$

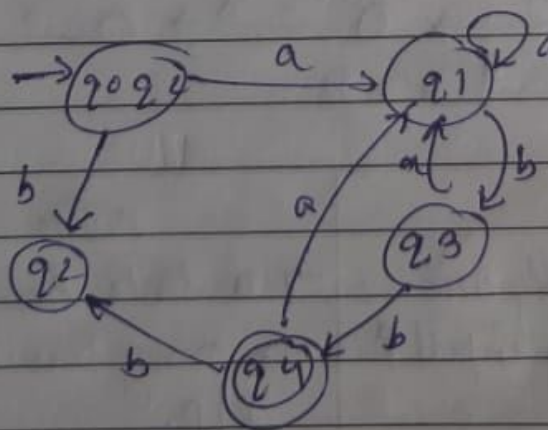
$\pi_2 = (\{q4\}, \{q3\}, \{q0, q2\}, \{q1\})$

$\pi_3 = (\{q4\}, \{q3\}, \{q1\}, \{q0, q2\})$

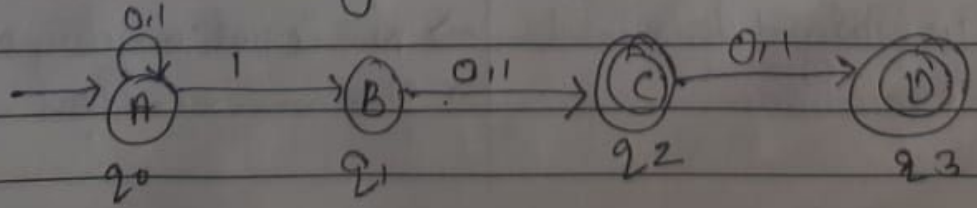
$\pi_2 = \pi_3$

I.S = q0 F.S = q4

		a	b
δ' →	q0q2	q1	q2
	q1	q1	q3
	q3	q1	q4
*	q4	q1	q2



Ques 2 Convert NFA to regular expression



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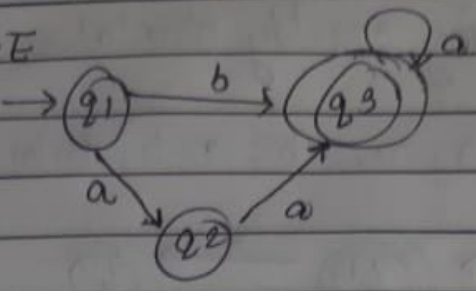
8) Find R.E



$q_1 = \Lambda$

$q_2 = q_1 a = a$

$q_3 = q_1 a + q_3 a + q_1 b$

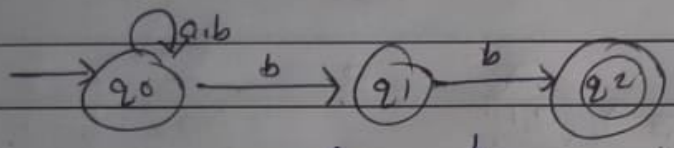
$q_3 = q_1 b + q_3 a + q_2 a$

$q_3 = b + q_0 a + q a$

$q_3 = \underbrace{b + qq}_{R} + \underbrace{q_3 a}_{RP}$

$(b + aa)\, a^*$

9) Convert NFA to DFA

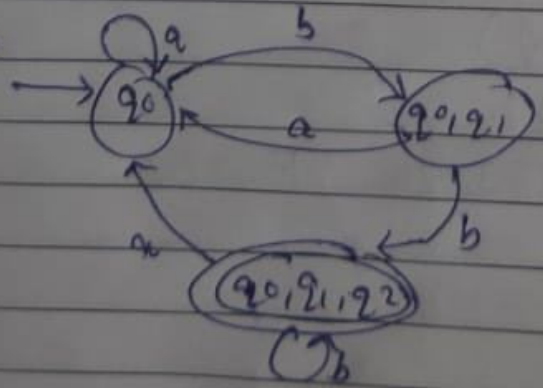


	a	b
→ q_0	q_0	$q_0 q_1$
q_1	-	q_2
* q_2	—	—

for DFA:

	a	b
→ $[q_0]$	$[q_0]$	$[q_0, q_1]$
$[q_0, q_1]$	$[q_0]$	$[q_0, q_1, q_2]$
* $[q_0, q_1, q_2]$	$[q_0]$	$[q_0, q_1, q_2]$

DFA:



10) Convert moore machine to Mealy machine:

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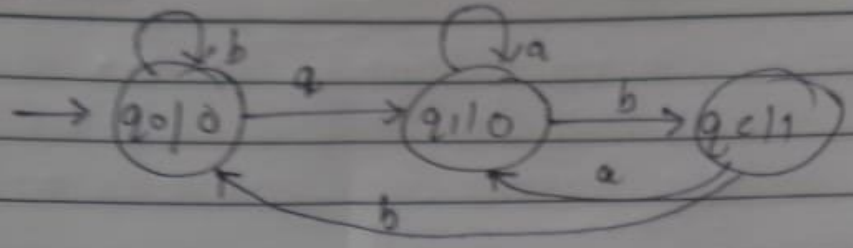
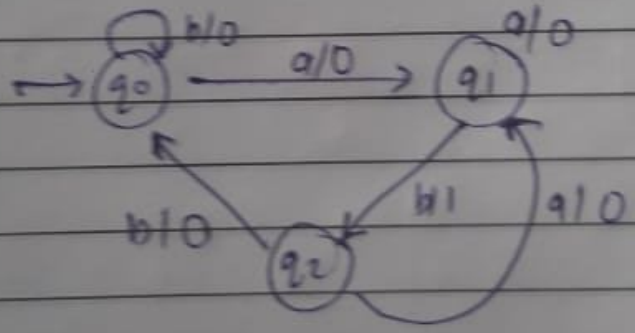


	a	b	o/p
→ q0	q1	q0	0
q1	q1	q2	0
q2	q1	q0	1

Mealy:

	a		b	
	N.S	o/p	N.S	o/p
→ q0	q1	0	q0	0
q1	q1	0	q2	1
q2	q1	0	q0	0



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$A = A0 + A1$
$B = A1 + \wedge$
$C = B0 + B1$
$D = C0 + C1$

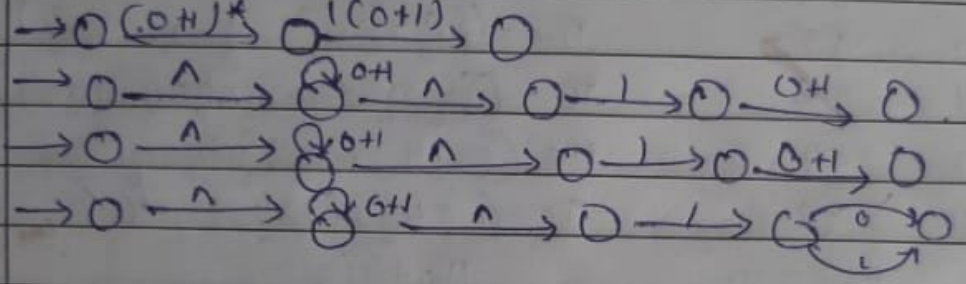
$q0 = q0 0 + q0 1 + \wedge$
$q1 = q0 1$
$q2 = q1 0 + q1 1$
$q3 = q2 0 + q2 1$

$q0 = q0(0+1)$
R R P

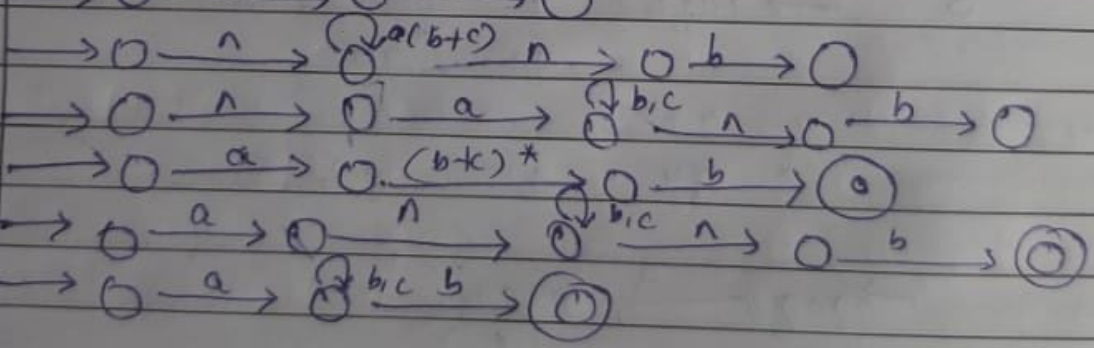
$q0 = (0+1)^*$

$q1 = (0+1)^* 1$

3] $(0+1)^* 1 (0+1)$



4] $a(b+c)^* b$



5]

DFA	NFA
→ Each state has exactly one transition for every input symbol	→ a state can have zero, one or many transition for same I/P.
→ Empty transition or ε-moves not allowed	→ Epsilon transitions are allowed
→ N.S is uniquely determined	→ N.S is not uniquely determined
→ faster execution	→ slower execution.

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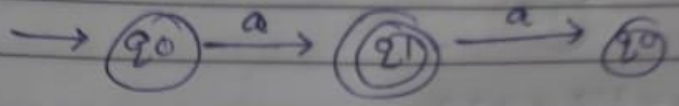
6) All strings containing exactly one 'a'.

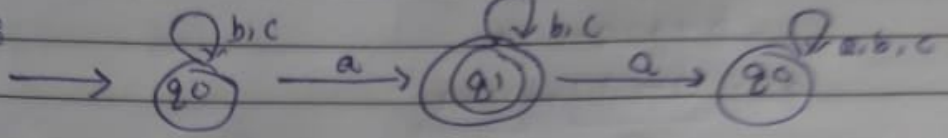
$\Sigma = a, b, c$

$L = \{a, ab, ac, ba, ca, abc, acb, abb, \dots\}$

NFA :

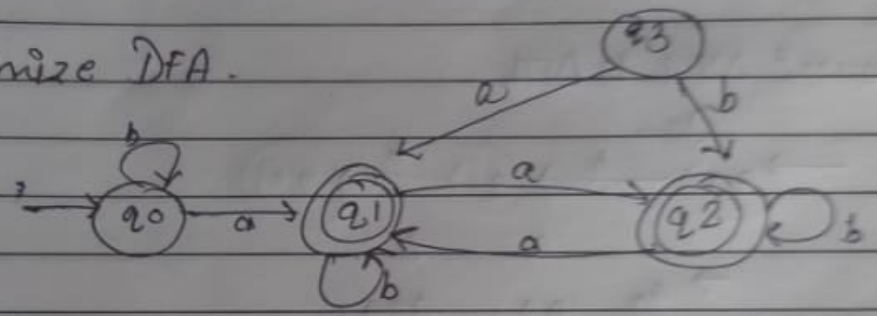


DFA :



$(b+c)^* a (b+c)^*$

7) Minimize DFA.



	a	b
→ q_0	q_1	q_0
* q_1	q_2	q_1
* q_2	q_1	q_2

$q_3 \longrightarrow$ non reachable state

$\pi_0 = (\{Q_1 Q_2\}, \{Q_0\})$

$\pi_0 = (\{q_1 q_2\}, \{q_0\})$

$\pi_1 = (\{q_1 q_2\}, \{q_0\})$

$\pi_0 = \pi_1$ I.S = q_0 F.S = $q_1 q_2$

	a	b
→ B	A	B
A	A	A