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CS-(C) III rd year.

Theory of Computation (CSLOS16).

Assignment - 1.

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Que-1 Give the finite automata accepting the following language over alphabet {0,1}.

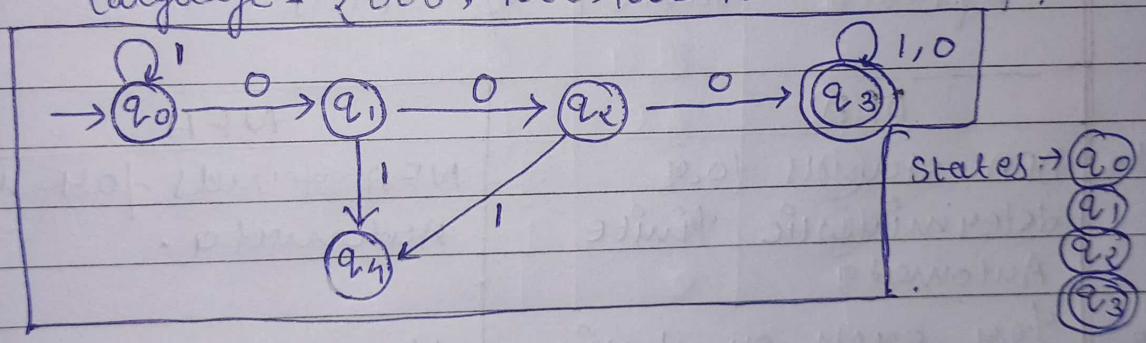
(a) The set of all strings with three consecutive 000's.

(b) The set of all strings who's last two symbols are same.

Solve (a). $\Sigma = \{0,1\}$., and, initial state => q_0
final state = q_4

Solve Finite automata.

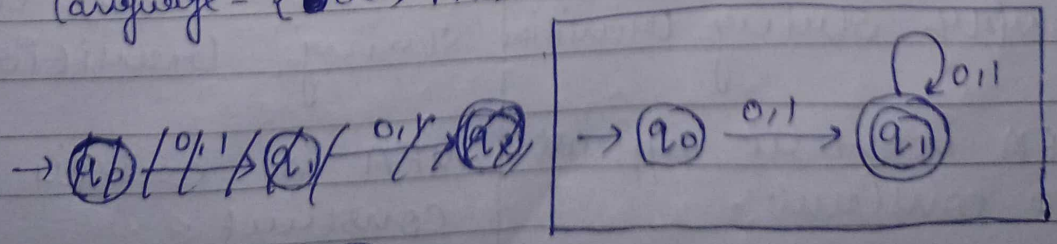
language = {000, 1000, 10001100 ——— .}.



(b). The set of all string's who's last two symbols are same.

$\Sigma = \{0,1\}$. initial state => q_0 final state = q_1

language = {●00, 111, 1011, 1100. ——— }.



States - q_0
q_1

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Ques = Difference between DFA & NFA and Define what is NFA ?

Ans = Non finite automata → A non finite automata also known as a "non finite state machine" or simply "non finite automation" is a theoritical computational model that is not restricted to finite number of states, unlike finite automata. In other words a non-finite automata can have an infinite number of states.

	DFA	NFA
1.	DFA stands for deterministic Finite Automata	NFA stands for Non finite Automata.
2.	For each symbolic representation of the alphabets there is only one state transition in DFA.	No need to specify how does the NFA react according to some symbol.
3.	DFA cannot use Empty string transition	NFA can use empty string transition.
4.	DFA is more difficult to construct.	NFA is easier to construct.
5.	All DFA are NFA.	Not all NFA are DFA.

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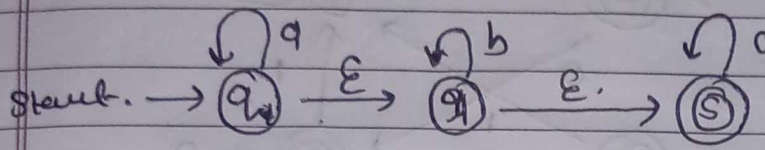
Que-3 Convert the following NFA with ε moves to DFA without ε moves.



Soln ε closure of q = {q, r, s}
ε closure of r = {r, s}.
ε ——— s = {s}.

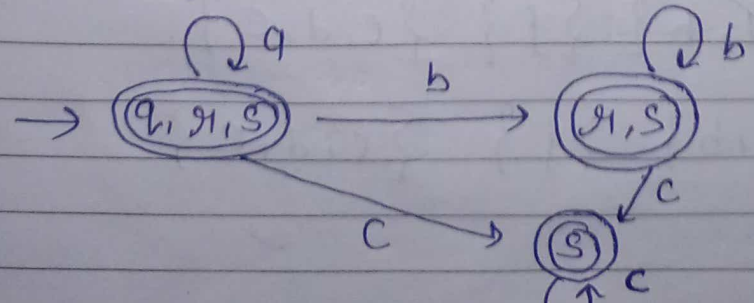
NFA table with ε:

δ	a	b	c	ε.
→ q	q	ϕ	ϕ	r.
r	ϕ	r	ϕ	s.
(s)	ϕ	ϕ	s	ϕ

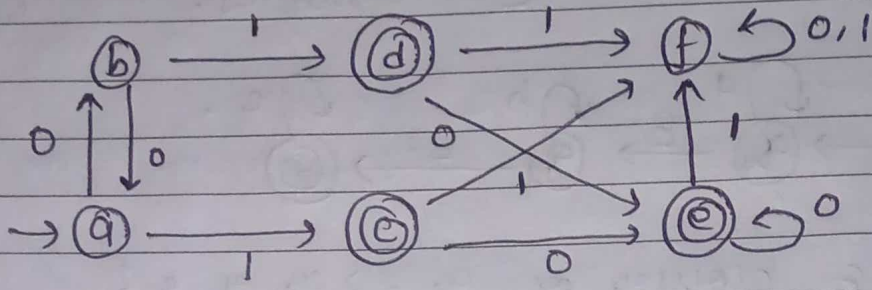
DFA table for transition.

δ_D	a	b	c.
→ (q, r, s)	{q, r, s}	{r, s}	{s}.
→ (r, s)	ϕ	{r, s}.	{s}.
(s).	ϕ	ϕ	{s}.

DFA Diagram.



Que 4 minimize the following finite automata.



Sol^n

transition table for this DFA.

State	0	1
→ a	b	c
b	a	c
c	e	f
d	e	f
e	e	f
f	f	f

~~This is no one state that is unreachable.~~

~~2 equivalence = {a,b,f} {c,d,e}.~~
~~1 equivalence = {a,b} {f} {c,d,e}.~~
~~2 equivalence = {a,b} {f} {c,d,e}.~~

$\pi_0 = \{a, b, f\}\ \{c, d, e\}$

$\pi_1 = \{a, b\}\ \{f\}\ \{c, d, e\}$.

$\pi_2 = \{a, b\}\ \{f\}\ \{c, d, e\}$.

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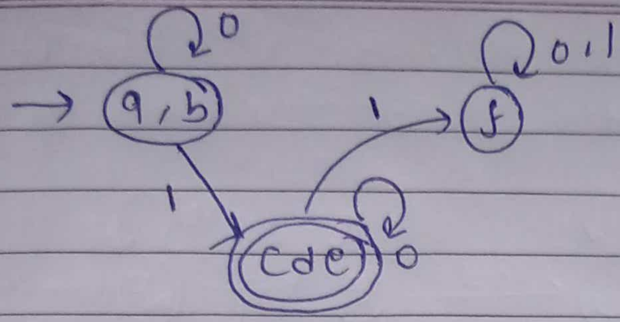

Qu-5 Define finite automata. Find DFA for the regular expression (110+11)* (10)*
1 2 3 4 5 6 7

An

~~first pos ...~~

(110+11)* + (10)* #
1 2 3 45 6 7 8.

first pos = (1,4,6,8)

Follow pos (1) = 2
(2) = 3
(3) = (1,4,6,8)
(4) = 5
(5) = 1,4,6,8.
(6) = 7
(7) = 6,8
(8) = φ