CS & IT ENGINEERING

THEORY OF COMPUTATION

Regular Expressions

DPP - 01

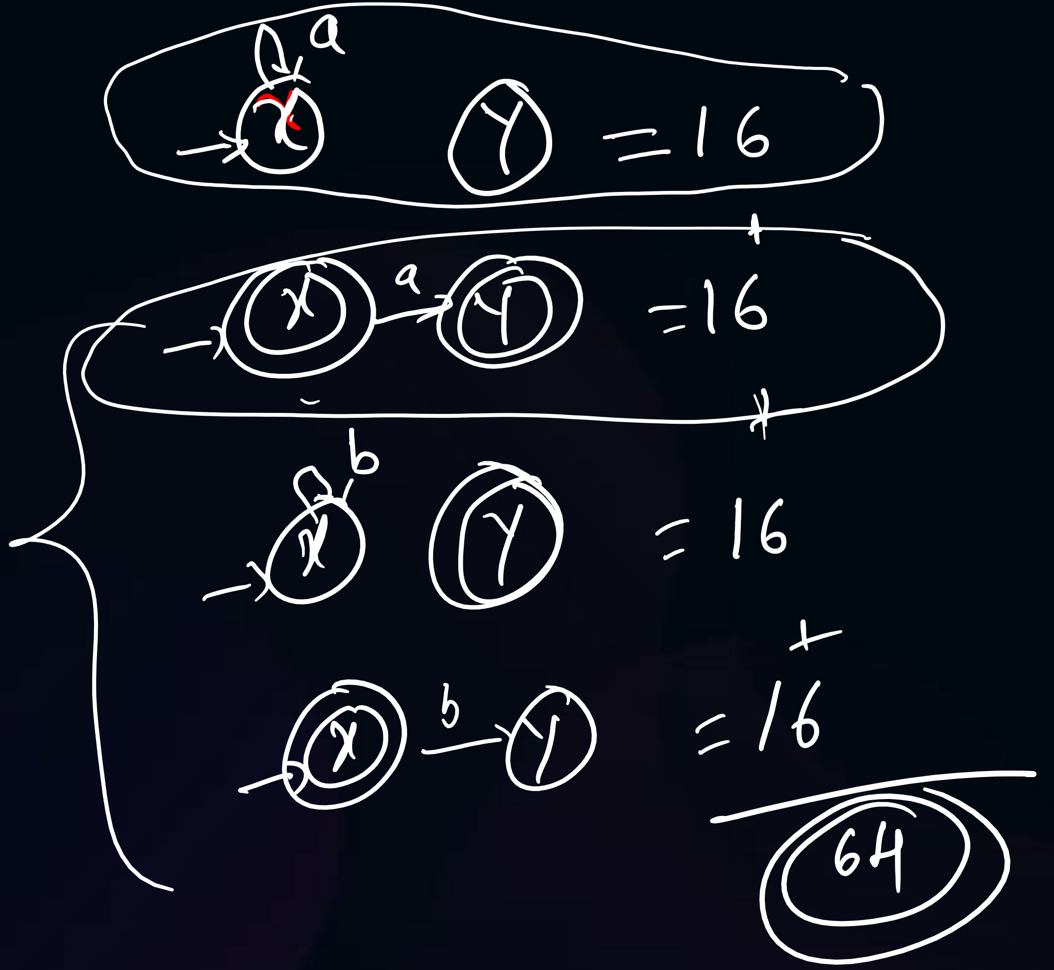
Discussion Notes

By- Venkat sir

[NAT]

$(Q, \Sigma, q_0, F, \delta)$

#Q. The possible number of DFA with 2 states X,Y over the alphabet {a, b} where X is always initial state ?



	a	b
$\rightarrow X$	2	2
Y	2	2

16

$2^4 = 16$

[NAT]

#Q. The possible number of DFA with 2 states X,Y over the alphabet {a, b} where X is always initial state , that accepts empty language?

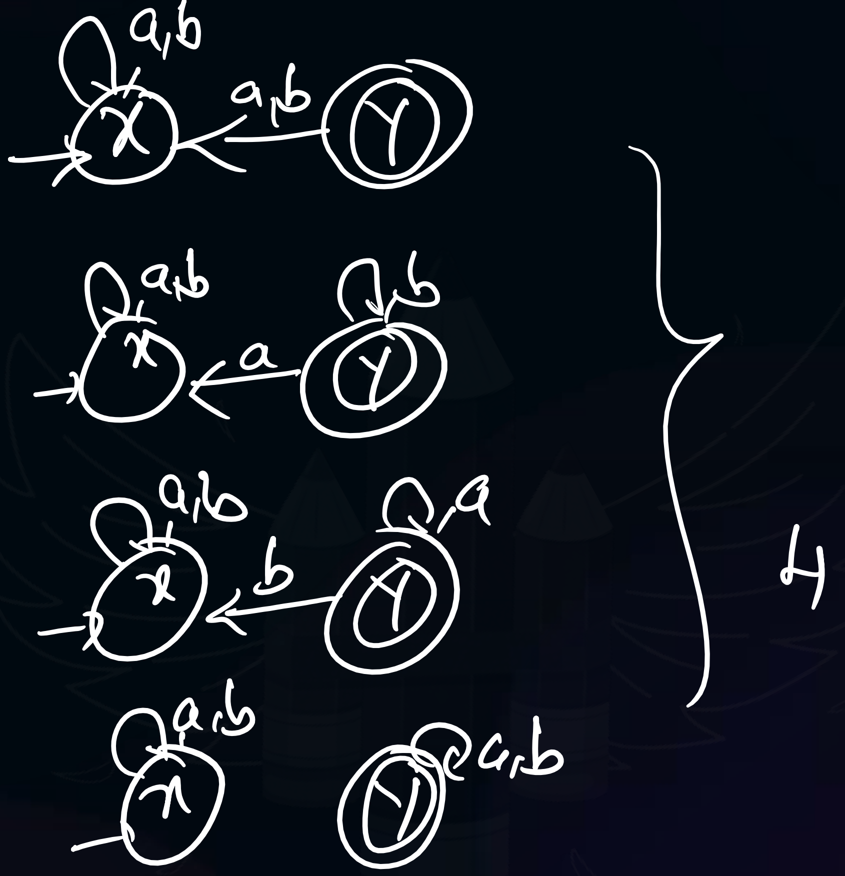
	a	b
→ X	2	2
Y	2	2

16

+

4

20



[NAT]

#Q. The possible number of DFA with 2 states X,Y over the alphabet {a, b} where X is always initial state , that accepts complete language?

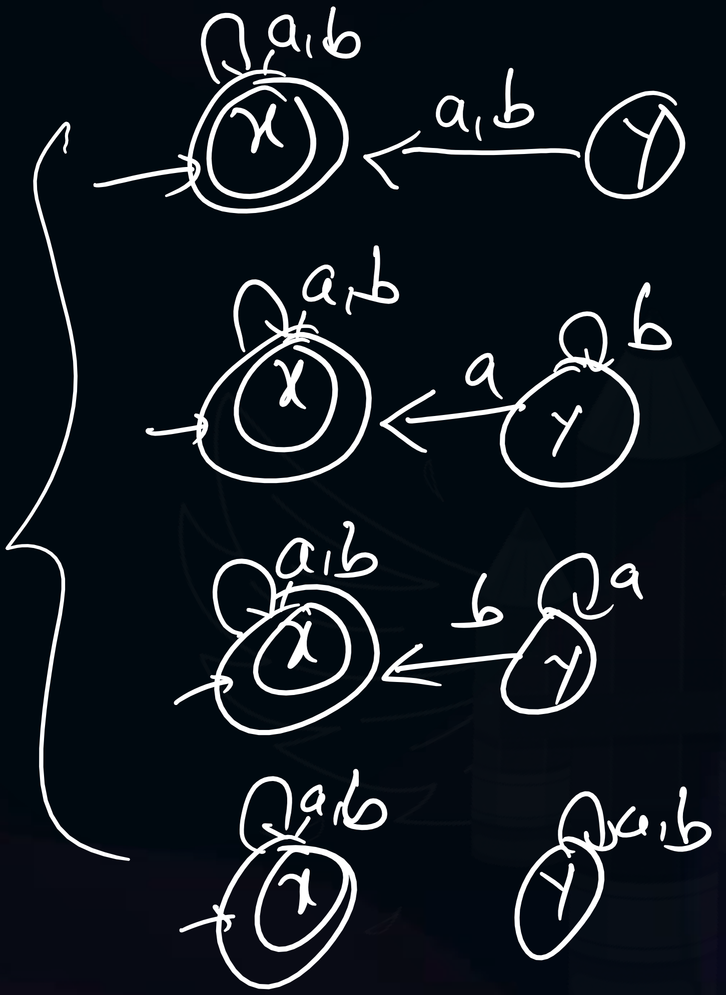
16

+

4

20

4



[MCQ]

Consider the DFA ,M with states Q={0,1,2,3,4}, input alphabet Σ = {0,1} start state 0, final state 0 and transition function $\delta(q,i) = |q^2 - i| \bmod 5$ $q \in Q$, input alphabets are {0,1}

#Q. The above DFA, M accepts all binary strings containing

A even number of l's

B odd number of 1's

C even number of 0's

D odd number of 0's

$\delta(q, i) = |q^2 - i| \bmod 5$

$\delta(0,0) = |0-0| \bmod 5 = 0$ ✓

$\delta(0,1) = |0-1| \bmod 5 = 1$ ✓

$\delta(1,0) = |1-0| \bmod 5 = 1$ ✓

$\delta(1,1) = |1-1| \bmod 5 = 0$ ✓

$\delta(2,0) = |4-0| \bmod 5 = 4$ ✓

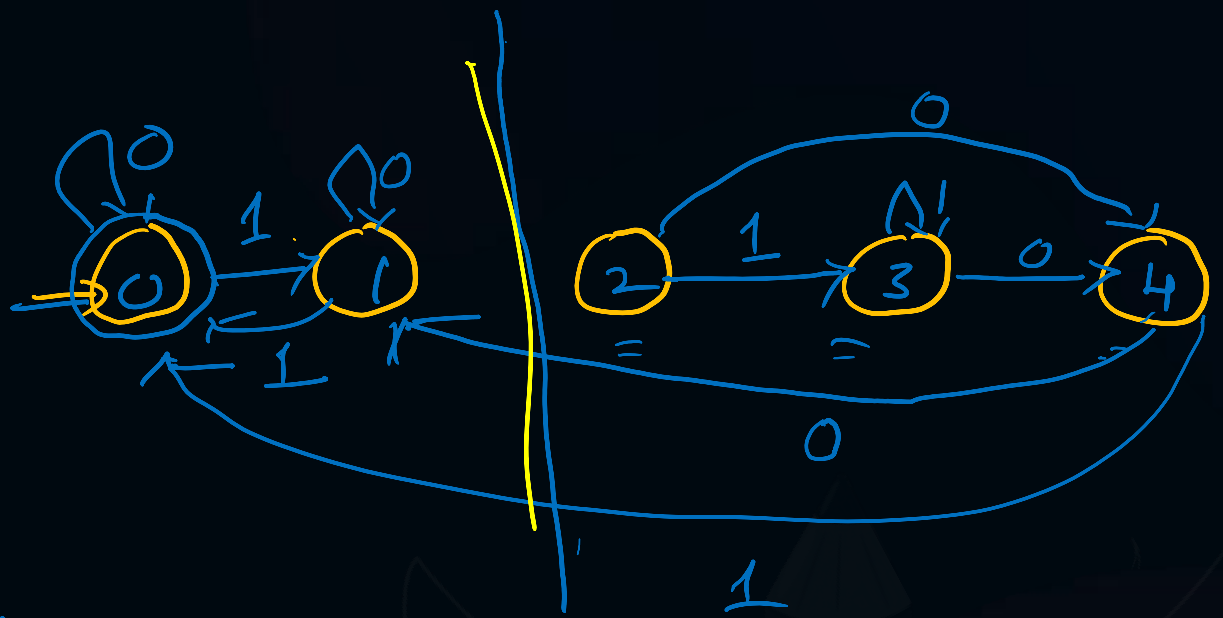
$\delta(2,1) = |4-1| \bmod 5 = 3$ ✓

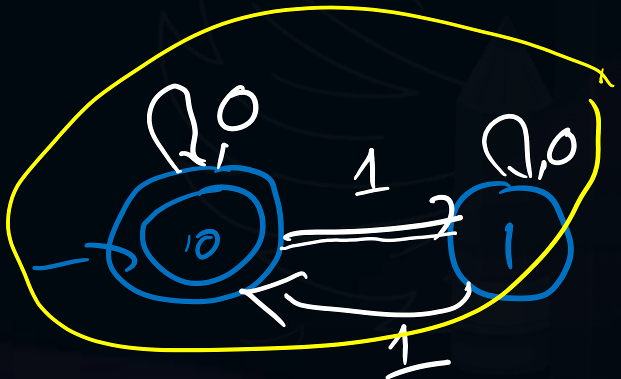
$\delta(3,0) = |9-0| \bmod 5 = 4$ ✓

$\delta(3,1) = |9-1| \bmod 5 = 3$ ✓

$\delta(4,0) = |16-0| \bmod 5 = 1$ ✓

$\delta(4,1) = |16-1| \bmod 5 = 0$ ✓





[MCQ] Consider the DFA ,M with states Q={0,1,2,3,4}, input alphabet $\Sigma = \{0,1\}$ start state 0, final state 0 and transition function $\delta(q,i)=|q^2-i| \bmod 5$ $q \in Q$, input alphabets are {0,1}

#Q. The number of states in the minimal finite automata ,which is equivalent to M is

A. 1

B. 2

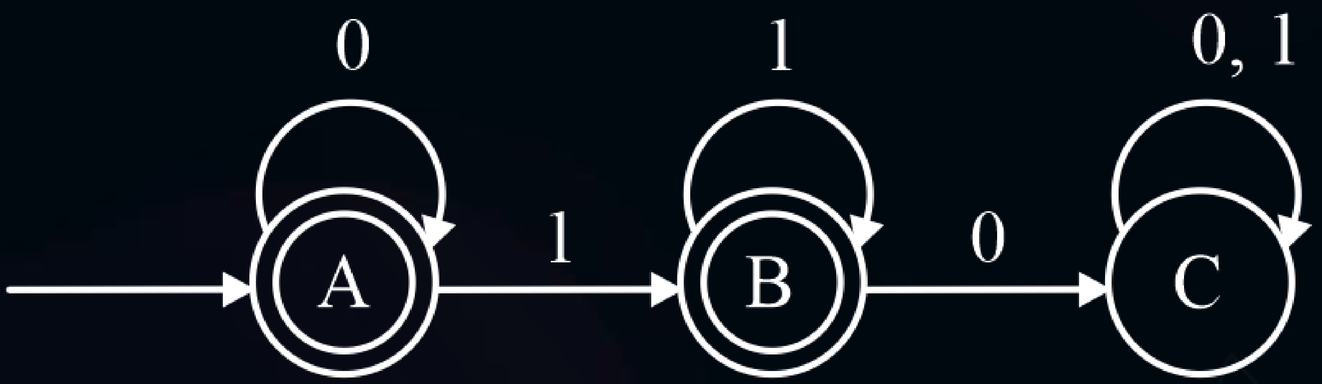
C. 3

D. 4

[MCQ]

#Q. The regular expression for the language recognized by the following finite automata is?

∈



10

A $(0 + 1)^*$

B $0(0 + 1)^*1$

C 0^*1^*

D $\cancel{0^*}(0 + 1)^*1\cancel{^*}$

[MCQ]

#Q. Choose the regular language from the following

MOM

dad

A. X $L = \{x/x \in (a+b)^*\}$ and is even length palindrome

B. $L = \{a^n / n \geq 1\} \longrightarrow$ Regular

C. $L = \{a^n b^{2n} / n \geq 1\} \longrightarrow$ non Regular

D. दवदम

[MCQ]

#Q. Which of the following regular expression represents all strings of a's and b's where the length of the string is at most 'n' is

$\epsilon, 1, 2, \ldots, n$

A $(a + b)^n$ → exactly

B $(a+b)^n(a+b)^*$ → atleast n

C $(a + b + \epsilon)^n$ → atmost n

D None of the above

C

[MCQ]

#Q. Which of the following pair of regular expressions are not equal

A. $(r^*)^*$ and $(r^*)^*$ → equal

B. $(r + \varepsilon)^*$ and r^* → equal

C. $(r + \varepsilon)^*$ and r^* $= \{\epsilon, r, r^2, r^3\}$ → not equal

D. None of the above

[MCQ]

#Q. Consider the language S*, where S is all strings of a's and b's with odd length. The other description of this language is.

A ~~All strings of a's and b's~~

B All even length strings of a's and b's

C All odd length strings of a's and b's

D None of the above

$S^* = \left[(a+b) \left[(a+b)(a+b) \right]^* \right]^*$

$= \left[(a+b)\, \epsilon \right]^* = (a+b)^*$

[MCQ]

#Q. Let r= (1 + 0)*, s = 11 *0 and t = 1*0 be three regular expressions. Which one of the following is true?

A. $L(s) \subset L(r)$ and $L(s) \subset L(t)$

B. $L(r) \subset L(s)$ and $L(s) \subset L(t)$

C. $L(t) \subset L(s)$ and $L(s) \subset L(r)$

D. None of the above

$t = \{0, \underbrace{10, 110, 1110 \ldots}\}$

$s = \{\underbrace{10, 110, 1110 \ldots}\}$

THANK - YOU