CS & IT ENGINEERING

Theory of Computation

Regular Expression

DPP-02

Discussion Notes

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[NAT]

#Q. Let

$L_1 = a^* b^*$

$L_2 = b^* a^*$

$L_3 = (a + b)^*$

$L_4 = a^* b^* a^*$

$L = (L_1 \cap L_2) - (L_3 \cup L_4)$

Number of strings in above language L will be $\underline{0}$.

$L = 0$

$L_1 = a^* b^*$

$L_2 = b^* a^*$

$\boxed{L_1 \cap L_2 = a^* + b^*}$

$L_3 = (a+b)^*$

$L_4 = a^* b^* a^*$

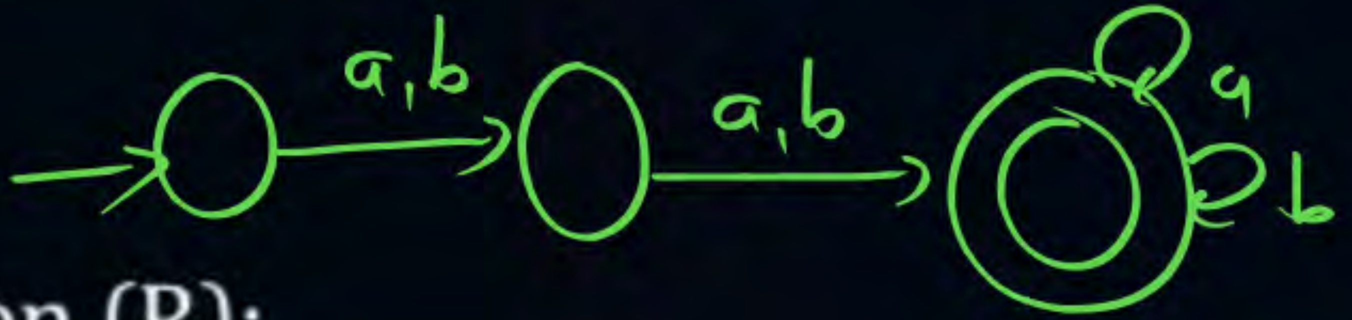
$L_3 \cup L_4 = (a+b)^* \cup a^* b^* a^*$

$= (a+b)^*$

$L = (a^* + b^*) - (a+b)^*$

$= 0$

[MCQ]



#Q. Consider a regular expression (R):

$R = (a + b)^* (a + b)^2 (a + b)^*$.

$(n+1)$

How many equivalences classes are existing for above regular expression R?

min DFA States

A 2

B 3

C 4

D None

No. of equivalence classes = No. of states of min DFA

[MCQ]

#Q. Let L be any formal language. If L^* is regular language then what is L?

A. L is regular.

B. L is non-regular.

C. L is CFL.

D. None of these.

$L^* = \text{regular}$ $\quad L^* = (a+b)^*$ ✓

$L = \text{regular} = (a+b) \rightarrow \text{reg}$

L

$\downarrow$

may (or) may not be

Regular

$L = \{ a^p \mid p \text{ is a prime number} \} \rightarrow$ Non regular

$L^* = \{ (a^p)^* \} \rightarrow$ regular

[MCQ]

$\boxed{L_1 = (a+b)^*} \cup L_2$

#Q. Consider the following two statements:

[I]: There exist a regular language L_1, such that for all language L_2, $L_1 \cup L_2$ is always regular. ✓

[II]: If all states of deterministic finite automata (DFA) except start state are final states then language accepted by DFA is Σ^+. ✗

$(a+b)^* a$

$(a+b)^+$

Which of the following is correct?

A. S_1 only. ✓

B. S_2 only.

C. Both S_1 and S_2 are true.

D. None of these.

[MCQ]

#Q. Consider the language L given by the regular expression $(a + b)^* ab(a + b)^*$ over the alphabet $\{a, b\}$. What is the correct regular expression of $\overline{L}$?

A $(a + b)^* (ab + ba + bb + aa) + \in$

B $(a^* b^*)^* (ba + bb + aa) (a^* b^*)^* + a + b$

C $(a + b)^* ba (a + b)^* + a + b$

D b^*a^*

$L = (a+b)^* ab (a+b)^*$

Sub string ab

L^c = not having substring ab

[MSQ]

#Q. For language L = {Every odd bit is a} On alphabet $\Sigma = \{a, b\}$. Which of the following is/are correct regular expression?

aaaaaaa   a b a b a b a
1 3 5 7

A ✓ $(aa + ab)^* (\epsilon + a)$

ba a   a b b b b b   (A, D)

B X $(aa + ab + ba + b)^* a$

C X $(aa + ba)^*(\epsilon + a + b)$ b

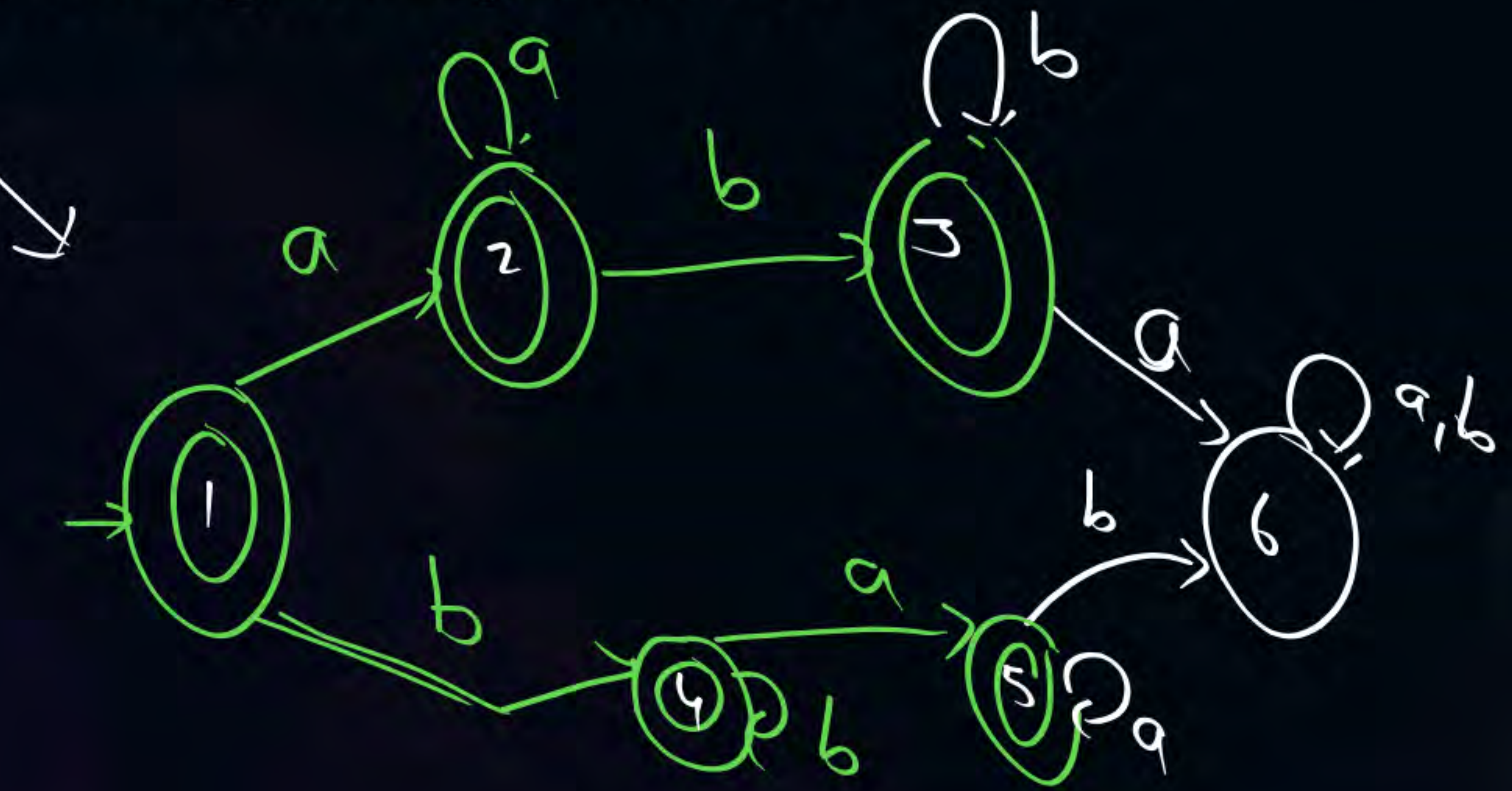
D $(a(a + b))^* + (a(a + b))^* a$

[NAT]

No. of states of min DFA.

#Q. Let us consider the following regular expression $R = a^*b^* + b^*a^*$.
How many equivalence classes of expression that represent language are equivalent to regular expression R?

Ans :: 6



[MSQ]

$l_2 \subseteq l_1$ $\quad$ $L_3 \subseteq L_2$

#Q. Consider the following languages:

$L_1 = \{a^m b^n c^p \mid m, n, p \geq 0\}$.

$L_2 = \{a^m b^m c^p \mid m, p \geq 0\}$.

$L_3 = \{a^{2m} b^{2m} c^p \mid m, p \geq 0\}$.

Which of the following is/are correct?

(B, C)

A ✗ $L_1 \subseteq L_2$ and $L_2 \subseteq L_1$

B ✓ $L_2 \subseteq L_1$ and $L_3 \subseteq L_1$

C ✓ $L_3 \subseteq L_2$ and $L_2 \subseteq L_1$

D ✗ $L_2 \subseteq L_3$ and $L_3 \subseteq L_1$

THANK - YOU