QUIZ NO.01

THEORY OF AUTOMATA

SOLUTION

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Question No.1

(a) Consider the language **S*,** where S = {a, *b}*.How many words does this language have of length 2? of length 3? Of length n?

Answer:

Length 2 → aa,bb,ab,ba
Length 3 → aaa,bbb,abb,aab,aba,baa,bab,bba
Length n → 2^n

(b) Consider the language **S*,** where S = *{aa, b}*.How many words does this language have of length 4? of length 5? Of length 6? What can be said in general?

Answer:
Length 4 → aaaa,aabb,baab,bbaa,bbbb
Length 5 →aaaab,aabaa,bbbaa,aabbb,bbaab,baabb,baaaa,bbbbb
Length 6 →
aaaaaa,aaaabb,bbaaaa,aabaab,baabaa,aabbaa,bbaabb,aabbbb,bbbbaa,baaaab,bbbbbb,baabbb,bbbaab
And so on followig this pattren.

Question. No.2

Write the Languages Ls of string for the following conditions?

a. The language L of strings of odd length, defined over $\sum = \{a\}$.
   L = {a,aaa,aaaaa,aaaaaaa …….}
b. The language L of strings of length 2, defined over r $\sum = \{0,1,2\}$.
   L = {00,01,02,10,11,12,20,21,22}
c. The language EQUAL, of strings with number of a's equal to number of b's, defined over $\sum = \{a, b\}$.
   L = {^,ab.abab,ba,baba,aabb,bbaa, …….. }
d. The language $\{a^n b^n a^n b^n\}$, of strings defined over $\sum = \{a, b\}$.
   L = {abab,aabbaabb,aaabbbaaabbb, …… }

Question No. 3

Write the Recursive definition of the following? **(1+1)**

a. Defining the language PALINDROME, defined over $\sum = \{a, b\}$.

Answer:

Step 01: a and b are in palindrome.

Step 02: If x is palindrome then s(x) Rev (s) and xx will also be palindrome where s belongs to S^*.

Step 03: No strings except those constructed above are allowed in palindrome.

b. Defining the language L, of strings containing aa or bb , defined over $\sum = \{a, b\}$.

Answer:

Step 01: aa and bb are in the basic words of the language.

Step 02: If x is the part of language then xaax and xbbx will also be the part of language where s belongs to S^*.

Step 03: No strings except those constructed above are allowed in palindrome.

Question No. 4

Construct the regular expression for?

a. All strings that end in a double letter.

(a+b)*(aa+bb) OR (a+b)*aa + (a+b)*bb

b. All strings that do not end in a double letter.

(a+b)*+a+b+ab+ba

c. For words with 'b' as the second letter

(a | b)b(a | b)*

d. All strings that do not have both the substrings bba and abb.

a*(baa*)*b* + b*(a*ab)*a*

e. All words that contain exactly two b's or exactly three b's.

a*ba*ba* + a*ba*ba*ba*

The End