Branch : CSE & IT Batch:Hinglish

Theory of Computation

Finite Automata

DPP-12

[MCQ]

1. Which of the following language is not regular?

(a) $L = \{w \mid w \in \{a, b\}^*\}$

(b) $L = \{xy \mid x, y \in \{a, b\}^*\}$

(c) $L = \{xy \mid |x| = |y| \; x, y \in \{a, b\}^*\}$

(d) None of these

[MSQ]

2. Which of the following language is/are regular?

(a) $L = \{ww^R \mid w \in \{0, 1\}^*\}$.

(b) L = {Set of all palindrome}.

(c) L = {Number of a's equal to number of b's}.

(d) $L = \{wwp \mid w, p \in \{0, 1\}^*\}$

[MCQ]

3. Consider the following given language L.

$L = \{p\ q\ w\ w\ y\ r \mid w, p, q, r \in \{a, b\}^*\}$

The regular expression generated by above language is?

(a) $(a + b)^2\ (aa + bb)\ (a + b)$

(b) $[(a + b)^2]^*\ (aa + bb)\ (a + b)^*$

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

(d) None of these

[MCQ]

4. Consider the language $L = \{w\ w\ p \mid w, p \in \{a , b\}^+\}$

Which of the following regular expression generated by above language?

(a) $(a + b)^+$

(b) $(a + b)^+\ (a + b)^+$

(c) $(aa + bb)\ (a + b)^+$

(d) None of these

[NAT]

5. Consider the following language L:

$L = \{xw \mid\mid x \mid = 2, w \in \{a, b\}^*\}$

For the above language L, how many equivalence classes are possible?_____.

[MCQ]

6. Consider the following languages.

$L_1 = \{w\ x\ w^R\} \mid w, x \in \{a, b\}^+\}$

$L_2 = \{w\ w^R\ x \mid w, x \in \{a, b\}^+\}$

Which of the following language is regular?

(a) L_1 is regular.

(b) L_2 is regular.

(c) Both L_1 and L_2 are regular.

(d) None of these.

Answer Key

1. **(d)**
2. **(d)**
3. **(c)**
4. **(d)**
5. **(3)**
6. **(a)**

Hints and Solutions

1. (d)

(a) Regular = (a + b)*

(b) Regular = (a + b)* (a + b)*
= (a + b)* Regular

(c) L = {xy | |x| = |y| x, y ∈ {a, b}*}
L = {aa, ab, ba, bb, bbaa, bbab …}
L = All even length string = Regular.

Hence, option (d) is correct.

2. (d)

L = {wwp | w,p ∈{0, 1}*}
L = ∈.∈. p = (0 + 1)*
= Regular

3. (c)

L = {pqwwr | p,q,r, w∈{a, b}*}
L = pq ∈∈r
= pqr
= (a + b)* (a + b)* (a + b)*
= (a + b)*

Hence, option (c) is correct.

4. (d)

L = {wwp | w, p ∈ {a, b}$^+$}
= minimal string = aap, bbp

- aaaap ∈ aap
- ababp ∉ any minimal string
- babap ∉ any minimal string
- bbbbp ∈ bbp

so, regular expression not possible.

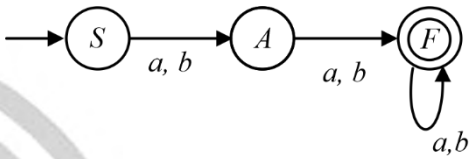
Hence, option (d) is correct.

5. (3)

L = {xw ||x| = 2, w ∈ {a, b}*}

Regular expression = $(a + b)^2 (a + b)^*$

DFA:

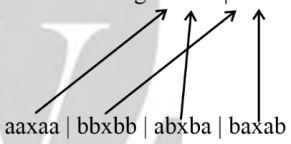


Number of equivalence classes = 3

6. (a)

L1 = {wxw^R | w, x }∈{a, b}$^+$}

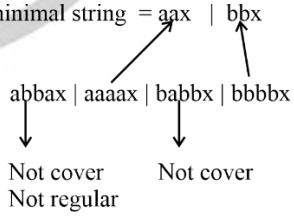
minimal string = a x a | b x b



L1 is regular.

L_2 = {ww^{R}x | w, x ∈ {a, b}$^+$}

minimal string = aax | bbx



Hence, option (a) is correct