Regular Expression Questions

Latest Regular Expression MCQ Objective Questions

Question 1:

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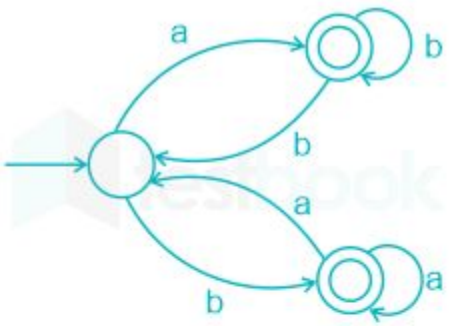
Which one of the following regular expressions correctly represents the language of the finite automaton given below?



1. ab*bab*+ba*aba*
2. (ab*b)*ab* + (ba*a)*ba*
3. (ab*b + ba*a)*(a* + b*)
4. (ba*a + ab*b)*(ab* + ba*)

Answer (Detailed Solution Below)

Option 4 : (ba*a + ab*b)*(ab* + ba*)

Regular Expression Question 1 Detailed Solution

The correct answer is **option 4.**

Concept:

Finite Automata:

Finite Automata (FA) is the most basic machine for pattern recognition. The finite automata, also known as the finite state machine, is an abstract machine with five components or tuples. It contains a set of states and rules for transitioning from one state to the next, but it is dependent on the input symbol used.

Explanation:

The given automata accept the strings like, {a, b, ab, ba, abb, aba, baa, bab, abbb, abab, baba, baaa, ...}

Option 1: ab*bab*+ba*aba*

False, The strings like {'a', 'b' } accepted by given automata but the given regular expression can not accept those strings. Hence it is false.

Option 2: (ab*b)*ab* + (ba*a)*ba*

False, The string "abbbbaa" is accepted by given automata but the given regular expression can not accept the string. Hence it is false.

Option 3:(ab*b + ba*a)*(a* + b*)

False, The given regular expression accepts the empty string like epsilon {Є} but the given automata can not accept that empty string. Hence it is false.

Option 4: (ba*a + ab*b)*(ab* + ba*)

True, The given regular expression accepts the strings {a, b, ab, ba, abb, aba, baa, bab, abbb, abab, baba, baaa, ...} which are accepted by given automata hence it is true.

Hence the correct answer is (ba*a + ab*b)*(ab* + ba*).

Question 2:

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Regular expression for the language L = {w ∈ {0, 1}*| w has no pair of consecutive zeros} is

1. (1 + 010)*
2. (01 + 10)*
3. (1 + 010)* (0 + λ)
4. (1 + 01)* (0 + λ)

Answer (Detailed Solution Below)

Option 4 : (1 + 01)* (0 + λ)

Regular Expression Question 2 Detailed Solution

Key Points

The given language is,

A regular expression for the language

L = {w ∈ {0, 1}*| w has no pair of consecutive zeros}

So the above regular language accepts the strings like { λ (epsilon), 0, 1, 01, 11 ,10, 111, 010, 011, 101, 110, ... }

Option 1:(1 + 010)*

False, The above language accepts the string "010010" but the given regular language can't accept the string.

Option 2: (01 + 10)*

False, The above language accepts the string "1001" but the given regular language can't accept the string.

Option 3: (1 + 010)* (0 + λ)

False, The above language accepts the string "010010" and "0100" but the given regular language can't accept the string.

Option 4: (1 + 01)* (0 + λ)

True, The above regular language accepts the strings like { λ (epsilon), 0, 1, 01, 11 ,10, 111, 010, 011, 101, 110, ... } and it is has no pair of consecutive zeros.

Option 5: (0 + 1)*

False, The above language accepts the string "00" but the given regular language can't accept the string. And it is a universal language.

Hence the correct answer is *(1 + 01)* (0 + λ).*

Question 3:

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Regular expression for the language L = {w ∈ {0, 1}*| w has no pair of consecutive zeros} is

1. (1 + 010)*
2. (01 + 10)*
3. (1 + 010)* (0 + λ)
4. (1 + 01)* (0 + λ)
5. (0 + 1)*

Answer (Detailed Solution Below)

Option 4 : (1 + 01)* (0 + λ)

Regular Expression Question 3 Detailed Solution

Key Points

The given language is,

A regular expression for the language

L = {w ϵ {0, 1}*| w has no pair of consecutive zeros}

So the above regular language accepts the strings like { λ (epsilon), 0, 1, 01, 11 ,10, 111, 010, 011, 101, 110, ... }

Option 1:(1 + 010)*

False, The above language accepts the string "010010" but the given regular language can't accept the string.

Option 2: (01 + 10)*

False, The above language accepts the string "1001" but the given regular language can't accept the string.

Option 3: (1 + 010)* (0 + λ)

False, The above language accepts the string "010010" and "0100" but the given regular language can't accept the string.

Option 4: (1 + 01)* (0 + λ)

True, The above regular language accepts the strings like { λ (epsilon), 0, 1, 01, 11 ,10, 111, 010, 011, 101, 110, ... } and it is has no pair of consecutive zeros.

Option 5: (0 + 1)*

False, The above language accepts the string "00" but the given regular language can't accept the string. And it is a universal language.

Hence the correct answer is *(1 + 01)* (0 + λ).*

Question 4:

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If r is a regular expression, then which of the followings is FALSE?

1. $r^* = r^* + \epsilon$
2. $r^*r^* = r^*$
3. $\epsilon r = r$
4. $(r^*)^* = r^+$

Answer (Detailed Solution Below)

Option 4 : $(r^*)^* = r^+$

Regular Expression Question 4 Detailed Solution

If r is a regular expression, $(r^*)^* = r^+$, it is false.

Explanation:-

If r is a regular expression,

$(r^*)^* = r^*$, closing an expression that is already closed does not change the language. [Closure Laws]

$\epsilon r = r$, $\Rightarrow \epsilon$ is the identity element for concatenation operator(.). [Identity Law]

$r^* = r^* + \epsilon$, [Closure Law]

$r^*r^* = r^*$, [Identity Law]

Additional Information

There are many identities for the regular expression. Let p, q, and r are regular expressions.

- $\emptyset + r = r$
- $\emptyset . r = r . \emptyset = \emptyset$
- $\epsilon . r = r . \epsilon = r$

- $\in^* = \in$ and $\emptyset^* = \in$
- $r + r = r$
- $r^*.r^* = r^*$
- $r.r^* = r^*.r = r^+$.
- $(r^*)^* = r^*$
- $\in + r.r^* = r^* = \in + r.r^*$
- $(p.q)^*.p = p.(q.p)^*$
- $(p + q)^* = (p^*.q^*)^* = (p^* + q^*)^*$
- $(p+ q).r = p.r + q.r$ and $r.(p+q) = r.p + r.q$

Question 5:

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Which of the following represents the language corresponding to the regular expression r =$(aa)^*$ $(bb)^*$ b ?

1. $L(r) = \{a^{2n}b^{2m+1} : n \geq 1, m \geq 1\}$
2. $L(r) = \{a^{2n}b^{2m} : n \geq 0, m \geq 0\}$
3. $L(r) = \{a^{2n}b^{2m} n \geq 1, m \geq 1\}$
4. $L(r) = \{a^{2n}b^{2m+1} : n \geq 0, m \geq 0\}$

Answer (Detailed Solution Below)

Option 4 : $L(r) = \{a^{2n}b^{2m+1} : n \geq 0, m \geq 0\}$

Regular Expression Question 5 Detailed Solution

The correct answer is **option 4.**

Concept:

The given regular expression r = $(aa)^*$ $(bb)^*$ b

For the above regular expression the accepted strings are, {b, aab, bbb, aabbb,aaaab,bbbbb, aaaabbbbb,...}

Option 1: L(r) = $\{a^{2n}b^{2m+1} : n \geq 1, m \geq 1\}$

False, It accepts the strings like, {aabbb, aaaabbbbb ,...}. It can not accept the strings "b, aab, bbb" but these strings are accepted by given regular expressions.

Option 2: L(r) = $\{a^{2n}b^{2m} : n \geq 0, m \geq 0\}$

False, It accepts the strings like, {ε, bb,aa,aabb,....}. It can not accept the strings "b, bbb" but these strings are accepted by given regular expressions.

Option 3: L(r) = $\{a^{2n}b^{2m}$ n ≥ 1, m ≥ 1}

False, It accepts the strings like, {aabb,aaaabbbb, ...}. It can not accept the strings "b, aab, bbb" but these strings are accepted by given regular expressions.

option 4: L(r) = $\{a^{2n}b^{2m+1} : n \geq 0, m \geq 0\}$

True, The regular expression of the accepted strings are, {b, aab, bbb, aabbb,aaaab,bbbbb, aaaabbbbb,...} and accepted by given regular expression.

Hence the correct answer is $L(r) = \{a^{2n}b^{2m+1} : n \geq 0, m \geq 0\}$.

Top Regular Expression MCQ Objective Questions

Question 6 View this Question Online >

Which one of the following regular expressions represents the language: the set of all binary strings having two consecutive 0s and two consecutive 1s?

1. (0 + 1) *0011 (0 + 1)* + (0 + 1) *1100 (0 + 1)*

2. (0 + 1) *(00(0 + 1)*11 + 11 (0 + 1)*00) (0 + 1)*

3. (0 + 1) *00 (0 + 1)* + (0 + 1) *11 (0 + 1)*

4. 00 (0 + 1) *11 + 11 (0 + 1) *00

Answer (Detailed Solution Below)

Option 2 : (0 + 1) *(00(0 + 1)*11 + 11 (0 + 1)*00) (0 + 1)*

Regular Expression Question 6 Detailed Solution

Consider all the options one by one:

1) (0 + 1) *0011 (0 + 1)* + (0 + 1) *1100 (0 + 1)*

It consider only those string which have either 0011 or 1100 as a substring. So, it is wrong.

2) (0 + 1) *(00(0 + 1)*11 + 11 (0 + 1)*00) (0 + 1)*

It contains set of all the binary strings that contain two consecutive 0's and 1's.

3) (0 + 1) *00 (0 + 1)* + (0 + 1) *11 (0 + 1)*

This set contains only those string which have either 00 or 11 as substring but not does not contain all the strings that contain two consecutive 0's and 1's.

4) 00 (0 + 1) *11 + 11 (0 + 1) *00

It represents those strings which start with 00 or 11 and end with 11 or 00 respectively. So, it is wrong.

Question 7 View this Question Online >

Consider the following regular expressions:

(a) r = a(b + a)*

(b) s = a(a + b)+

(c) t = aa*b

Choose the correct answer from the options given below based on the relation between the languages generated by the regular expressions above:

1. L(r) ⊆ L(s) ⊆ L(t)
2. L(r) ⊇ L(s) ⊇ L(t)
3. L(r) ⊇ L(t) ⊇ L(s)
4. L(s) ⊇ L(t) ⊇ L(r)

Answer (Detailed Solution Below)

Option 2 : L(r) ⊇ L(s) ⊇ L(t)

Regular Expression Question 7 Detailed Solution

The correct answer is **option 2**

Explanation:

L(r) = {a, aa, ab, aaa, aab, ... } This is a set of all strings starting with 'a'

L(s) = {aa, ab, aaa, aab, ... } This is a set of all strings starting with 'aa' or 'ab'

L(t) = {ab, aab, aaab, aaaab, ...} This a set of all strings starting with 'a', ending with 'b' and contains any number of 'a's in between them.

Therefore L(r) ⊇ L(s) ⊇ L(t)

Additional Information

* represents 0 or more number of symbols.

+ represents 1 or more number of symbols.

+ represents 1 or more number of symbols.

Question 8

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Match the following:

P. Lexical analysis	1. Graph coloring
Q. Parsing	2. DFA minimization
R. Register allocation	3. Post-order traversal
S. Expression evaluation	4. Production tree

1. P – 2, Q – 3, R – 1, S - 4
2. P – 2, Q – 1, R – 4, S - 3
3. P – 2, Q – 4, R – 1, S - 3
4. P – 2, Q – 3, R – 4, S - 1

Answer (Detailed Solution Below)

Option 3 : P – 2, Q – 4, R – 1, S - 3

Regular Expression Question 8 Detailed Solution

Lexical analysis: Lexical analysis is the first phase of compiler also known as scanner. It converts the high level input program into a sequence of tokens. Lexical analysis can be implemented by

the high-level input program into a sequence of tokens. Lexical analysis can be implemented by deterministic finite automata.

Parsing: Parser constructs a production tree. Parse tree is a hierarchical structure which represents the derivation of the programmer to yield input strings.

Register allocation: Register allocation reduces to graph coloring problem in which colors (registers) are assigned to the nodes such that two nodes connected by an edge do not receive the same color.

Expression evaluation: Expression evaluation is done using post order traversal.

Question 9 View this Question Online >

Let L_1 and L_2 be languages over $\sum = \{a, b\}$ represented by the regular expressions $(a^* + b)^*$ and $(a + b)^*$ respectively.

Which of the following is true with respect to the two languages?

1. $L_1 \subset L_2$
2. $L_2 \subset L_1$
3. $L_1 = L_2$
4. $L_1 \cap L_2 = \phi$

Answer (Detailed Solution Below)

Option 3 : $L_1 = L_2$

Regular Expression Question 9 Detailed Solution

The correct answer is **option 3.**

Key Points

(a+b)* is a universal set grammer which can generate all strings over all possible alphabet "a"and"b".

$(a^* + b)^* = a^*$ can generate epsilon, and reamaining part is like $(a + b)^*$

$(a^* + b)^* = (a + b^*)^* = (a^*b^*)^* = (a^* + b^*)^* = a^*(ba^*)^* = b^*(ab^*)^* = (a + b)^*$ all grammers are equal.

∴ Hence the correct answer is $L_1 = L_2$.

Question 10 View this Question Online >

Which of the following classes of languages can validate an IPv4 address in dotted decimal format? It is to be ensured that the decimal values lie between 0 and 255.

1. RE and higher
2. CFG and higher
3. CSG and higher
4. Recursively enumerable language

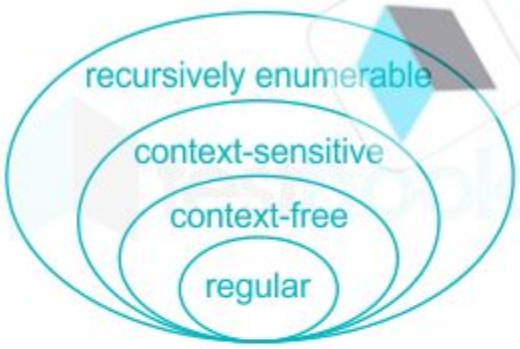
Answer (Detailed Solution Below)

Option 1 : RE and higher

Regular Expression Question 10 Detailed Solution

Since the strings are a part of a finite set whose decimal values lie between 0 and 255, the valid classes of languages fall under the category of RE (regular expression) and higher.

Note that, all the options form valid class of languages but choosing any other option than 1 would mean that the string cannot be verified using a finite automata. Every language that is regular, is by default Context free, context sensitive and recursively enumerable.



Question 11 View this Question Online >

Which of the following regular expressions represent(s) the set of all binary numbers that are divisible by three? Assume that the string ∈ divisible by three.

1. (0 + 1(01*0)*1)*
2. (0*(1(01*0)*1)*)*
3. (0 + 11 + 10(1 + 00)*01)*
4. (0+ 11 + 11(1 + 00)*00)*

Answer (Detailed Solution Below)

Option :

Regular Expression Question 11 Detailed Solution

Answer: Option 1, Option 2 and Option 3

Concept :

A DFA is a finite Automata which is Deterministic in Nature i.e. On every State transition on each input symbol must be defined.

DFA is represented by 5 tuples $(Q, \sum, \delta, q_0, F)$

Q – finite set of states.

$\sum$ - Set of input symbols.

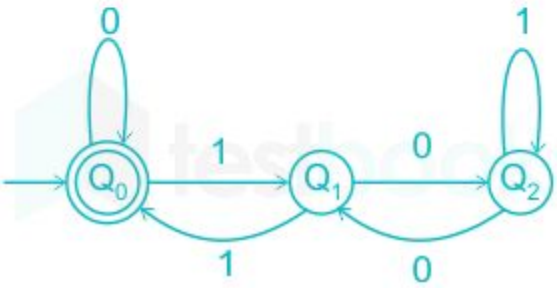
δ – Transition Functions

q_0 – Initial State

F – Set of Final State

Explanation :

DFA of the given language given below



Where , $Q = \{ Q_0, Q_1, Q_2 \}$

$\sum = \{ 0, 1 \}$

$q_0 = Q_0$ //Initial State

Question 12

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Which of the following expression results in zero?

1. (0 + 0 + 1)(0 + 0 + 1)
2. (0 + 0 + 0)(0 + 1 + 1)
3. (1 + 0 + 0)(1 + 1 + 1)

4. (0 + 1 + 0)(1 + 0 + 1)

Answer (Detailed Solution Below)

Option 2 : (0 + 0 + 0)(0 + 1 + 1)

Question 13 View this Question Online >

Which of the following is the correct regular expression to represent the of strings in {a, b}* with an odd number of a's?

1. b* ab* (ab*a)*b*
2. (ab)* (ab)*
3. b* ab(ab*)*
4. b* (ab* ab*)* ab*

Answer (Detailed Solution Below)

Option 4 : b* (ab* ab*)* ab*

Question 14

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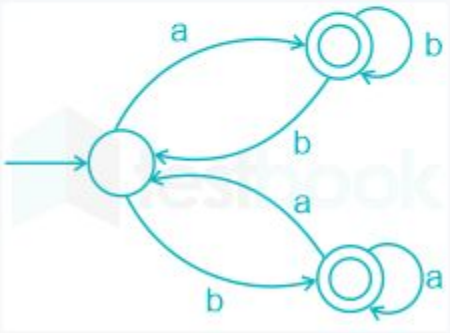
Which one of the following regular expressions correctly represents the language of the finite automaton given below?



1. ab*bab*+ba*aba*
2. (ab*b)*ab* + (ba*a)*ba*
3. (ab*b + ba*a)*(a* + b*)
4. (ba*a + ab*b)*(ab* + ba*)

Answer (Detailed Solution Below)

Option 4 : (ba*a + ab*b)*(ab* + ba*)

Question 15

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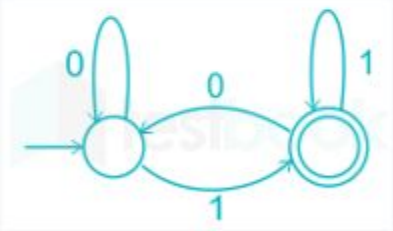
Which of the regular expressions given below represent the following DFA?



I) 0*1(1+00*1)*

II) 0*1*1+11*0*1

III) (0+1)*1

1. I and II only
2. I and III only
3. II and III only
4. I, II, and III

Answer (Detailed Solution Below)

Option 2 : I and III only