

Dastgir Sabri

<https://dastgirsabri.wordpress.com>

<https://dastgirsabri317.wixsite.com/dastgirsabri>

<https://dastgirsabri.blogspot.com>

Theory of Automata MCQs with Answers

Very Important MCQs:

- a) DFA Stands for_____ **Deterministic finite automata**
- b) NFA Stands for_____ **Non-Deterministic finite automata**
- c) RE stands for_____ **Regular Expression**
- d) TG stands for_____ **Transition Graph**
- e) CFG Stands for_____ **Context Free Grammar**
- f) PDA Stands for_____ **Push Down Automata**
- g) Language defined by Regular Expression is called **Regular Language**
- h) Language defined by Finite Automata (DFA, NFA) is called

Finite Language

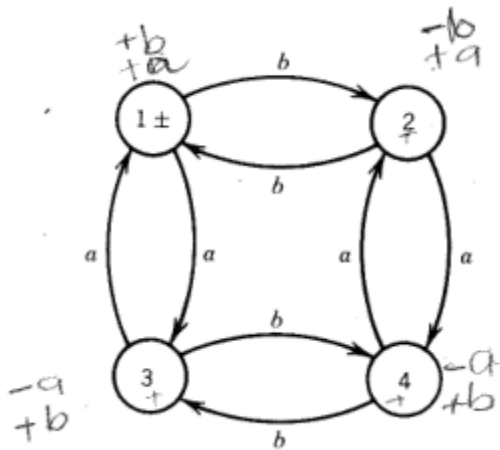
i) TM Stands for

Turing Machine

j) RE for Even Even Language is

$$E = [aa + bb + (ab + ba)(aa + bb)^*(ab + ba)]^*$$

k) FA for Even Even Language is



l) Kleene Star is represented by

*

+

m) Positive Closure is represented by

+

*

n) In DFA

^ null transition is not allowed

o) In NFA

^ null transition is allowed

p) In TG

Substrings are allowed

q) In NFA

Sub strings are not allowed

r) Terminals

Can change, always start with Small Letter

s) Non-Terminals

Can not change, always start with Capital Letter

Some other Important MCQs

(1) For a given input, it provides the compliment of Boolean AND output.

NAND box (NOT AND)

DELAY box

OR box

AND box

(2) It delays the transmission of signal along the wire by one step (clock pulse).

NAND box (NOT AND)

DELAY box

OR box

AND box

(3) For the given input, it provides the Boolean OR output

NAND box (NOT AND)

DELAY box

OR box

AND box

(4) For the given input, AND box provides the Boolean AND output.

True

False

(5) The current in the wire is indicated by 1 and 0 indicates the absence of the current.

True

False

(6) Any language that can not be expressed by a RE is said to be regular language.

True

False

(7) If L1 and L2 are regular languages is/are also regular language(s).

$L_1 + L_2$

$L_1 L_2$

L_1

All of above

(8) Let L be a language defined over an alphabet Σ , then the language of strings, defined over Σ , not belonging to L , is called Complement of the language L , denoted by L^c or L' .

True False

(9) To describe the complement of a language, it is very important to describe the ----- of that language over which the language is defined.

Alphabet

Regular Expression

String

Word

(10) For a certain language L , the complement of L^c is the given language L i.e. $(L^c)^c = L$

True

False

(11) If L is a regular language then, ----- is also a regular language.

L^m

L^s

L^x

L^c

(12) Converting each of the final states of F to non-final states and old non-final states of F to final states, FA thus obtained will reject every string belonging to L and will accept every string, defined over Σ , not belonging to L . is called

Transition Graph of L

Regular expression of L

Complement of L

Finite Automata of L

(13) If L_1 and L_2 are two regular languages, then $L_1 \cup L_2$ is not a regular.

True

False

(14) De-Morgan's law for sets is expressed by,

$$\begin{aligned} (L_1^c \cap L_2^c)^c &= L_1^c \cap L_2^c \\ (L_1^c \cap L_2^c)^c &= L_1^c \cap L_2^c \\ (L_1^c \cap L_2^c)^c &= L_1 \cap L_2 \\ (L_1^c \cap L_2^c)^c &= L_1 \cup L_2 \end{aligned}$$

(15) If L1 and L2 are regular languages, then these can be expressed by the corresponding FAs.

True

False

(16) L= language of words containing even number of a's. Regular Expression is

(a+b)aa(a+b)

(b+aba)

a+bbaaba

(a+b)ab(a+b)

(17) The regular expression defining the language $L_1 \cup L_2$ can be obtained, converting and reducing the previous ----- into a ----- as after eliminating states.

GTG, TG

FA, GTG

FA, TG

TG, RE

(18) The language that can be expressed by any regular expression is called a Non regular language.

True

False

(19) The languages ----- are the examples of non regular languages.

PALINDROME and PRIME

PALINDROME and EVEN-EVEN

EVEN-EVEN and PRIME

FACTORIAL and SQUARE

(20) Let L be any infinite regular language, defined over an alphabet Σ then there exist three strings x , y and z belonging to Σ^* such that all the strings of the form XY^nZ for $n=1,2,3, \dots$ are the words in L . called.

Complement of L

Pumping Lemma

Kleene's theorem

None in given

(21) Languages are proved to be regular or non regular using pumping lemma.

True

False

(22) ----- is obviously infinite language.

EQUAL-EQUAL

EVEN-EVEN

PALINDROME

FACTORIAL

(23) If, two strings x and y , defined over Σ , are run over an FA accepting the language L , then x and y are said to belong to the same class if they end in the same state, no matter that state is final or not.

True

False

Myhill Nerode theorem is consisting of the followings,

L partitions Σ^* into distinct classes.

If L is regular then, L generates finite number of classes.

If L generates finite number of classes then L is regular.

All of above

The language Q is said to be quotient of two regular languages P and R , denoted by $Q = R/P$ if $PQ = R$.

$R = Q/P$

$Q = R/P$

$Q = P/R$

$P = R/Q$

If two languages R and Q are given, then the prefixes of Q in R denoted by $\text{Pref}(Q \text{ in } R)$.

True

False

(27) Let $Q = \{aa, abaaabb, bbaaaaa, bbbbbb\}$ and $R = \{b, bbbb, bbbaaa, bbbaaaa\}$

Pref (Q in R) is equal to,

{b,bbba,bbbbaaa}

{b,bba,bbaaa}

{ab,bba,bbbbaa}

{b,bba,bbba}

If R is regular language and Q is any language (regular/ non regular), then Pref (Q in R) is -----
-.

Non-regular

Equal

Regular

Infinite

"CFG" stands for _____

Context Free Graph

Context Free Grammar

Context Finite Graph

Context Finite Grammar

(29) _____ states are called the halt states.

ACCEPT and REJECT

ACCEPT and READ

ACCEPT AND START

ACCEPT AND WRITE

(30) The part of an FA, where the input string is placed before it is run, is called _____

State

Transition

Input Tape

Output Tape

In new format of an FA (discussed in lecture 37), This state is like dead-end non final state

ACCEPT

REJECT

STATR

READ

For language L defined over {a, b}, then L partitions {a, b} into classes

Infinite

Finite

Distinct

Non-distinct

The major problem in the earliest computers was

To store the contents in the registers

To display mathematical formulae

To load the contents from the registers

To calculate the mathematical formula

Between the two consecutive joints on a path

One character can be pushed and one character can be popped

Any no. of characters can be pushed and one character can be popped

One character can be pushed and any no. of characters can be popped

Any no. of characters can be pushed and any no. of characters can be popped

(35) In pumping lemma theorem ($x y^n z$) the range of n is

$n=1, 2, 3, 4, \dots$

$n=0, 1, 2, 3, 4, \dots$

$n=\dots, -3, -2, -1, 0, 1, 2, 3, 4, \dots$

$n=\dots, -3, -2, -1, 1, 2, 3, 4, \dots$

(36) The PDA is called non-deterministic PDA when there are more than one out going edges from..... state

START or READ

POP or REJECT

READ or POP

PUSH or POP

Identify the TRUE statement:

A PDA is non-deterministic, if there are more than one READ states in PDA

A PDA is never non-deterministic

Like TG, A PDA can also be non-deterministic

A PDA is non-deterministic, if there are more than one REJECT states in PDA

There is a problem in deciding whether a state of FA should be marked or not when the language Q is infinite.

True

False

If an effectively solvable problem has answered in yes or no, then this solution is called -----

Decision procedure

Decision method

Decision problem

Decision making

The following problem(s) ----- is/are called decidable problem(s).

The two regular expressions define the same language

The two FAs are equivalent

Both a and b

None of given

To examine whether a certain FA accepts any words, it is required to seek the paths from ----- state.

Final to initial

Final to final

Initial to final

Initial to initial

The high level language is converted into assembly language codes by a program called compiler.

TRUE

FALSE

Grammatical rules which involve the meaning of words are called -----

Semantics

Syntactic

Both a and b

None of given

Grammatical rules which do not involve the meaning of words are called -----

Semantics

Syntactic

Both a and b

None of given

The symbols that can't be replaced by anything are called -----

Productions

Terminals

Non-terminals

All of above

The symbols that must be replaced by other things are called _____

Productions

Terminals

Non-terminals

None of given

(47) The grammatical rules are often called _____

Productions

Terminals

Non-terminals

None of given

The terminals are designated by _____ letters, while the non-terminals are designated by _____ letters.

Capital, bold

Small, capital

Capital, small

Small, bold

The language generated by _____ is called Context Free Language (CFL).

FA

TG

CFG

TGT

(49) $\Sigma = \{a, b\}$ Productions $S \rightarrow XaaX$ $X \rightarrow aX$ $X \rightarrow bX$ $X \rightarrow \Lambda$

This grammar defines the language expressed by _____

$(a+b)aa(a+b)$

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

$(a+b)aa(a+b)aa$

$(a+b)aba+b)$

(50) $S \rightarrow aXb|b$ $XaX \rightarrow aX|bX|\Lambda$ The given CFG generates the language in English

Beginning and ending in different letters

Beginning and ending in same letter

Having even-even language

None of given

(51) The CFG is not said to be ambiguous if there exists atleast one word of its language that can be generated by the different production trees,

TRUE

FALSE

The language generated by that CFG is regular if _____

No terminal \rightarrow semi word

No terminal \rightarrow word

Both a and b

None of given

The production of the form no terminal $\rightarrow \Lambda$ is said to be null production.

TRUE

FALSE

(54) A production is called null able production if it is of the form $N \rightarrow \Lambda$

TRUE

FALSE

(55) The productions of the form nonterminal \rightarrow one nonterminal, is called _____

Null production

Unit production

Null able production

None of given

(56) CNF is stands for

Context Normal Form

Complete Normal Form

Chomsky Normal Form

Compared Null Form

Proof(Kleene's Theorem Part II)

If a TG has more than one start states, then

Introduce the new start state

Eliminate the old start state

Replace the old start state with final state

Replace the old final state with new start state

Question # 2

While finding RE corresponding to TG, we connect the new start state to the old start state by the transition labeled by

Select correct option:

a

b

null string

None of the given options

Question # 3 of 10 (Start time: 05:49:03 PM) Total Marks: 1

Which of the following regular expression represents same language? a. $(a+ab)b$. $(ba+a)c$.

$a(aab)d$. (ab)

$a+b)a(a+b)b(a+b)+ (a+b)b(a+b)a(a+b)$.

$\{ x \}$, $\{ x \}^+$, $\{ a+b \}$

Select correct option:

a and b

a and c

c and d

Question # 4 of 10 (Start time: 05:50:32 PM) Total Marks: 1

$(a+ b)=(a + b)$ this expression is _____

Select correct option:

True

False

Question # 5 of 10 (Start time: 05:51:30 PM) Total Marks: 1

Let FA3 be an FA corresponding to $FA1+FA2$, then the initial state of FA3 must correspond to the initial state of

Select correct option:

FA1 only

FA2 only

FA1 or FA2

FA1 and FA2

Question # 6 of 10 (Start time: 05:53:01 PM) Total Marks: 1

Which of the following statement is NOT true about TG?

Select correct option:

There exists exactly one path for certain string

There may exist more than one paths for certain string

There may exist no path for certain string
There may be no final state

Question # 7 of 10 (Start time: 05:54:06 PM) Total Marks: 1

Kleene's theorem states

Select correct option:

All representations of a regular language are equivalent.

All representations of a context free language are equivalent.

All representations of a recursive language are equivalent

Finite Automata are less powerful than Pushdown Automata.

Question # 8 of 10 (Start time: 05:55:36 PM) Total Marks: 1

What do automata mean?

Select correct option:

Something done manually

Something done automatically

Question # 9 of 10 (Start time: 05:56:51 PM) Total Marks: 1

A language accepted by an FA is also accepted by

Select correct option:

TG only

GTG only

RE only

All of the given

Question # 10 of 10 (Start time: 05:58:16 PM) Total Marks: 1

If $r_1 = (aa + bb)$ and $r_2 = (a + b)$ then the language $(aa + bb)(a + b)$ will be generated by

Select correct option:

$(r_1)(r_2)$

$(r_1 + r_2)$

$(r_2)(r_1)$

(r_1)

Question No: 1 (Marks: 1) - Please choose one

If $r_1 = (aa + bb)$ and $r_2 = (a + b)$ then the language $(aa + bb)(a + b)$ will be generated by

► $(r_1)(r_2)$

► $(r_1 + r_2)$

► $(r_2)(r_1)$

► (r_1)

Question No: 2 (Marks: 1) - Please choose one

“One language can be expressed by more than one FA”. This statement is _____

► True

- ▶ False
- ▶ Some times true & sometimes false
- ▶ None of these

Question No: 3 (Marks: 1) - Please choose one

Who did not invent the Turing machine?

- ▶ Alan Turing
- ▶ A. M. Turing
- ▶ Turing
- ▶ None of these

Question No: 4 (Marks: 1)- Please choose one

Which statement is true?

- ▶ The tape of turing machine is infinite.
- ▶ The tape of turing machine is finite.
- ▶ The tape of turing machine is infinite when the language is regular
- ▶ The tape of turing machine is finite when the language is nonregular.

Question No: 5 (Marks: 1) - Please choose one

A regular language:

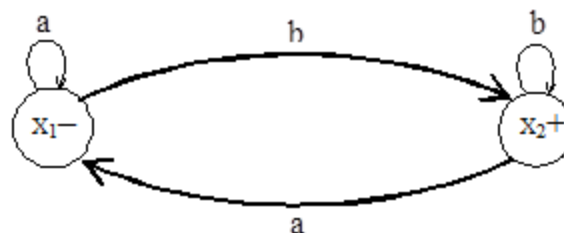
- ▶ Must be finite
- ▶ Must be infinite
- ▶ Can be finite or infinite
- ▶ Must be finite and cannot be infinite

Question No: 6 (Marks: 1) - Please choose one

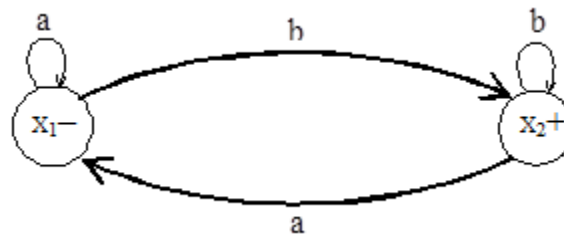
Every regular expression can be expressed as CFG but every CFG cannot be expressed as a regular expression. This statement is:

- ▶ Depends on the language
- ▶ None of the given options
- ▶ True
- ▶ False

Question No: 7 (Marks: 1) - Please choose one



Above given FA corresponds RE r . then FA corresponding to rw will be



This statement is

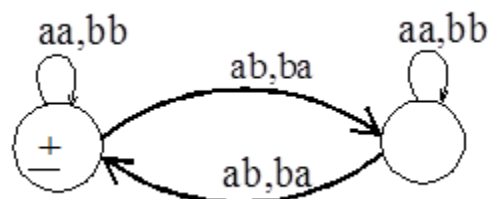
- ▶ True
- ▶ False
- ▶ Depends on language
- ▶ None of these

Question No: 8 (Marks: 1) - Please choose one

Consider the language L of strings, defined over $\Sigma = \{a,b\}$, ending in a

- ▶ There are finite many classes generated by L , so L is regular
- ▶ There are infinite many classes generated by L , so L is regular
- ▶ There are finite many classes generated by L , so L is non-regular
- ▶ There are infinite many classes generated by L , so L is non-regular

Question No: 9 (Marks: 1) - Please choose one



Above given TG has _____ RE.

- ▶ $(aa+aa+(ab+ab)(aa+ab)(ab+ba))$
- ▶ $(aa+bb+(ab+ba)(aa+bb)(ab+ba))$
- ▶ $(aa+bb+(ab+ba)(aa+bb)(ab+ba))$
- ▶ None of these

Question No: 10 (Marks: 1) - Please choose one

The word 'formal' in formal languages means

- ▶ The symbols used have well defined meaning
- ▶ They are unnecessary, in reality
- ▶ Only the form of the string of symbols is significant
- ▶ None of these

Question No: 11 (Marks: 1) - Please choose one

Let $A = \{0, 1\}$. The number of possible strings of length 'n' that can be formed by the elements of the set A is

- ▶ $n!$
- ▶ n^2
- ▶ n^m
- ▶ 2^n

Question No: 12 (Marks: 1) - Please choose one

Choose the correct statement.

- ▶ A Mealy machine generates no language as such
- ▶ A Moore machine generates no language as such
- ▶ A Mealy machine has no terminal state
- ▶ All of these

Question No: 13 (Marks: 1) - Please choose one

TM is more powerful than FSM because

- ▶ The tape movement is confined to one direction
- ▶ It has no finite state control
- ▶ It has the capability to remember arbitrary long sequences of input symbols
- ▶ None of these

Question No: 14 (Marks: 1) - Please choose one

If L_1 and L_2 are expressed by regular expressions r_1 and r_2 , respectively then the language expressed by $r_1 + r_2$ will be _____

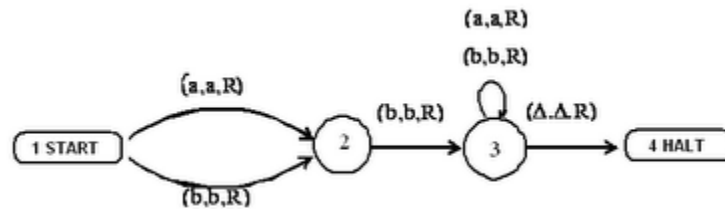
- ▶ Regular
- ▶ Ir-regular
- ▶ Can't be decided
- ▶ Another Language which is not listed here

Question No: 15 (Marks: 1) - Please choose one

Like TG, a PDA can also be non-deterministic

- ▶ True
- ▶ False

Question No: 16 (Marks: 1) - Please choose one



The above machine is a/anTG _____

- ▶ Finite Automata
- ▶ Turing machine
- ▶ FA
- ▶ TG

Question No: 17 (Marks: 1) - Please choose one

The language of all words (made up of a's and b's) with at least two a's can not be described by the regular expression.

- ▶ $a(a+b)a(a+b)(a+b)ab$
- ▶ $(a+b)aba(a+b)$
- ▶ $baba(a+b)$
- ▶ none of these

Question No: 18 (Marks: 1) - Please choose one

In FA, if one enters in a specific state but there is no way to leave it, then that specific state is called

- ▶ Dead State
- ▶ Waste Basket
- ▶ Davey John Locker
- ▶ All of these

Question No: 19 (Marks: 1) - Please choose one

If L is a regular language then, L^c is also a _____ language.

- ▶ Regular
- ▶ Non-regular
- ▶ Regular but finite
- ▶ None of the given

Question No: 20 (Marks: 1) - Please choose one

In CFG, the symbols that can't be replaced by anything are called____

- ▶ Terminal
- ▶ Non-Terminal

- ▶ Production
- ▶ All of given

Question No: 21 (Marks: 1) - Please choose one

Which of the following is NOT a regular language?

- ▶ String of 0's whose length is a perfect square
- ▶ Set of all palindromes made up of 0's and 1's
- ▶ String of 0's whose length is a prime number
- ▶ All of the given options

Question No: 22 (Marks: 1) - Please choose one

Choose the incorrect (FALSE) statement.

- ▶ A Mealy machine generates no language as such
- ▶ A Mealy machine has no terminal state
- ▶ For a given input string, length of the output string generated by a Moore machine is not more than the length of the output string generated by that of a Mealy machine
- ▶ All of these

Question No: 23 (Marks: 1) - Please choose one

Pumping lemma is generally used to prove that:

- ▶ A given language is infinite
- ▶ A given language is not regular
- ▶ Whether two given regular expressions of a regular language are equivalent or not
- ▶ None of these

Question No: 24 (Marks: 1) - Please choose one

Which of the following is a regular language?

- ▶ String of odd number of zeroes
- ▶ Set of all palindromes made up of 0's and 1's
- ▶ String of 0's whose length is a prime number
- ▶ All of these

Question No: 25 (Marks: 1) - Please choose one

Choose the incorrect statement:

- ▶ $(a+b)aa(a+b)$ generates Regular language.
- ▶ A language consisting of all strings over $\Sigma=\{a,b\}$ having equal number of a's and b's is a regular language
- ▶ Every language that can be expressed by FA can also be expressed by RE
- ▶ None of these

Question No: 26 (Marks: 1) - Please choose one

Left hand side of a production in CFG consists of:

- ▶ One terminal
- ▶ More than one terminal
- ▶ One non-terminal
- ▶ Terminals and non-terminals