

1. There are _____ tuples in finite state machine.

- a) 4
- b) 5
- c) 6
- d) unlimited

Ans:- B

2. Transition function maps.

- a) $\Sigma * Q \rightarrow \Sigma$
- b) $Q * Q \rightarrow \Sigma$
- c) $\Sigma * \Sigma \rightarrow Q$
- d) $Q * \Sigma \rightarrow Q$

Ans: - d

3. Number of states requires accepting string ends with 10 in DFA.

- a) 3
- b) 2
- c) 1
- d) can't be represented.

Ans:-a

4. Number of final state requires accepting Φ in minimal finite automata.

- a) 1
- b) 2
- c) 3
- d) None of the mentioned

Ans:-d

5. An NFA's transition function returns

- a. A Boolean value
- b. A state
- c. A set of states
- d. An edge

Ans:C

6. The behaviour of a NFA can be stimulated by DFA

- a. Always
- b. Sometimes
- c. Never

d. Depends on NFA

Ans:-a

7. The relation between NFA-accepted languages and DFA accepted languages is

a. >

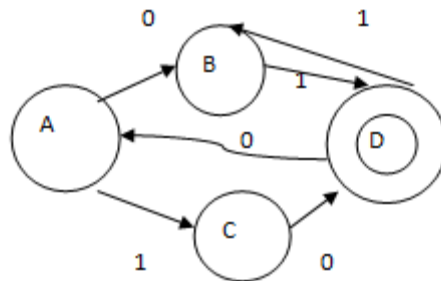
b. <

c. =

d. <=

Ans:- c

8. Examine the following DFA: If input is 011100101, which edge is NOT traversed?



a. A B

b. C

c. C D

d. D A

Ans:- C

9. The transitional function of a NFA is

a. $Q \times \Sigma \rightarrow Q$

b. $Q \times \Sigma \rightarrow 2Q$

c. $Q \times \Sigma \rightarrow 2^n$

d. $Q \times \Sigma \rightarrow Q^n$

Ans:- B

10. Which is true for Dead State?

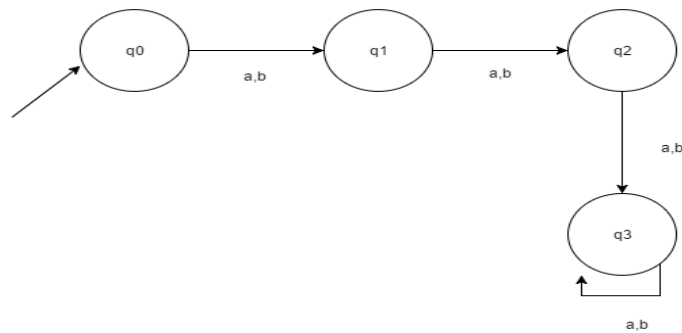
a. It cannot be reached anytime

- b. There is no necessity of the state
- c. If control enters no way to come out from the state
- d.If control enters FA deads

Ans:- C

11. Which among the following states would be notated as the final state/acceptance state?

$L = \{x \in \Sigma^* \mid \text{length of } x \text{ is } 2\}$

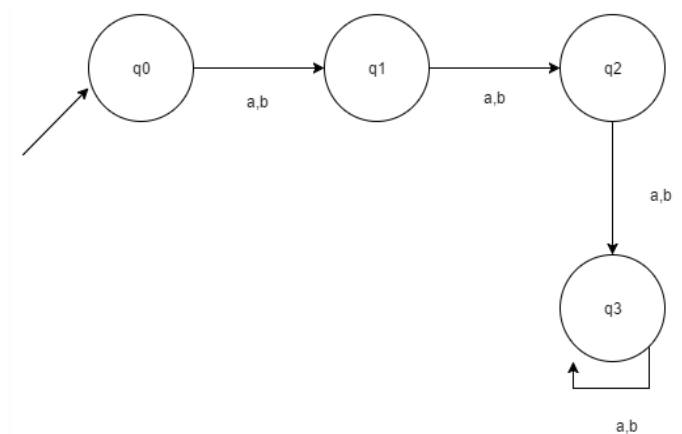


- a. q1
- b. q2
- c. q1, q2
- d. q3

Ans:- b

12. Which of the following are the final states in the given DFA according to the Language given ?

$L = \{x \in \Sigma^* \mid \text{length of } x \text{ is at most } 2\}$



- a. q_0, q_1
- b. q_0, q_2
- c. q_1, q_2
- d. q_0, q_1, q_2

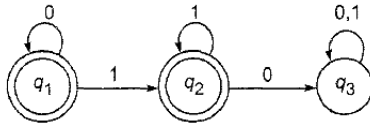
Ans:D

1. For the following N DFA, what would be the states in a corresponding DFA?

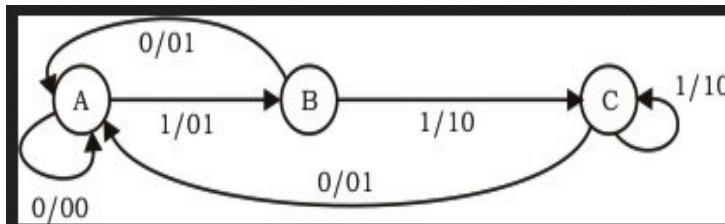
State/ Σ	0	1
$\rightarrow q_0$	q_0	q_1
q_1	q_1	q_0, q_1

- a. $[q_0]$
 - b. $[q_0], [q_1]$
 - c. $[q_0], [q_0, q_1]$
 - d. $[q_0], [q_1], [q_0, q_1]$
2. "DFA is said to be a specific case of N DFA and for every N DFA that exists for a given language, an equivalent DFA also exists". The statement is True or False?
- a. True
 - b. False
3. While converting N DFA to DFA, $\delta'([q_0, q_1, \dots q_i], a)$ is written as _____
- a. $\delta([q_0, q_1, \dots q_i], a)$
 - b. $\delta([q_0], a)$
 - c. $\delta(q_0, a) \cup \delta(q_1, a) \dots \cup \delta(q_i, a)$
 - d. None of above
4. A Finite Automata with \wedge - moves is considered to be _____
- a. DFA
 - b. N DFA
5. Let P and Q be two regular expressions over Σ . If P does not contain \wedge , then according to Arden's theorem, $R = Q + RP$ has a unique solution given by _____
- a. $R = QP^*$

- b. $R = Q + P^*$
 - c. $R = Q^*P$
 - d. $R = Q + P$
6. By using Arden's Theorem, the equation $q_1 = q_1(ab + ba) + \epsilon$ can be written as,
- a. $q_1 = (a + b)^*$
 - b. $q_1 = (abba)^*$
 - c. $q_1 = (ab + ba)^*$
 - d. $q_1 = (ab)^*$
7. Arden's theorem is true for:
- a. More than one initial states
 - b. **Non-null transitions**
 - c. Null transitions
 - d. None of the above
8. Arden's theorem is false for:
- a. **More than one initial states**
 - b. Non-null transitions
9. Algebraic method using Arden's theorem is used for _____
- a. Converting a Regular Expression into a Transition System
 - b. **Finding a Regular Expression corresponding to a given Transition System**
10. The regular expression corresponding to the equation $q_2 = 0^*1 + q_2(1)$ when an Arden's Theorem is applied is _____
- a. **$(0^*1)1^*$**
 - b. $(00)^*$
 - c. $(11)^*$
 - d. 0^*1^*
11. Which of the following is useful for converting a finite automaton into a regular expression?
- a. Null Moves
 - b. Kleen's Closure
 - c. Transition Function
 - d. **Arden's Theorem**
12. Recognize the regular expression corresponding to the following Finite Automata using Arden's Method:



- a. 0^*1^*
 - b. $(0 + 1)^*$
 - c. $(1101)^*$
 - d. $(0 + 11 + 010)^*$
1. An automata in which output depends only on the states of the machine is called
 - a) An automaton without a Memory
 - b) Automaton with a finite Memory
 - c) Moore Machine
 - d) Mealy Machine
 2. An automata in which output depends only on the states as well as on the input at any instant of time is called
 - a) An automaton without a Memory
 - b) Automaton with a finite Memory
 - c) Moore Machine
 - d) Mealy Machine
 3. The Finite state machine described by the following state diagram with A as starting state, where an arc label is x / y and x stands for 1-bit input and y stands for 2- bit output
[GATE CS 2002]



- a) Outputs the sum of the present and the previous bits of the input.
- b) Outputs 01 whenever the input sequence contains 11.
- c) Outputs 00 whenever the input sequence contains 10.
- d) None of these

Explanation:

We assume the input string to be 1101.

1. (A, 1) \rightarrow (B, 01)

Here, previous input bit + present input bit = $0 + 1 = 01$ = output

2. (B, 1) \rightarrow (C, 10)

Here, previous input bit + present input bit = $1 + 1 = 10$ = output

3. (C, 0) \rightarrow (A, 01)

Here, previous input bit + present input bit = $1 + 0 = 01$ = output

4. (A, 1) \rightarrow (B, 01)

Here, previous input bit + present input bit = $0 + 1 = 01$ = output

Thus, option (A) is correct.

4. In Moore Machine, suppose if Input='101', then the output would be of length:

- a) |Input|+1
- b) |Input|
- c) |Input-1|
- d) Cannot be predicted

Explanation:

Initial state, from which the operations begin is also initialized with a value.

5. What is the output for the given language?

Language: A set of strings over $\Sigma = \{a, b\}$ is taken as input and it prints 1 as an output "for every occurrence of a b as its substring. (INPUT: abaaab)

- a) 0010001
- b) 0101010
- c) 0111010
- d) 0010000

6. Which of the following is a correct statement?

- a) Moore machine has no accepting states
- b) Mealy machine has accepting states
- c) We can convert Mealy to Moore but not vice versa
- d) All of the mentioned

7. Find output string for the input string 0111 from the following Moore Machine

Present State	Next State		Output
	a=0	a=1	
$\rightarrow q_0$	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

- a) 00010
- b) 10110
- c) 11111
- d) 10101

8. Find output string for the input string 1111 from the following Moore Machine

Present State	Next State		Output
	a=0	a=1	
->q ₁	q ₂	q ₂	0
q ₂	q ₃	q ₃	1
q ₃	q ₄	q ₄	0
q ₄	q ₃	q ₄	0

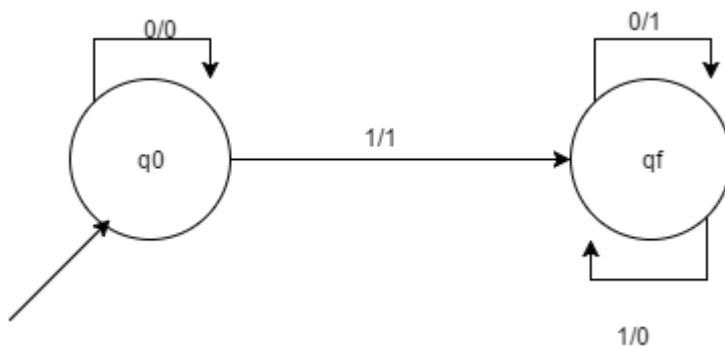
- a) 01000
- b) 00110
- c) 11111
- d) 10101

9. Find output string for the input 0010 from the following Mealy machine

Present State	Next State			
	a=0		a=1	
	State	Output	State	Output
->q ₁	q ₃	0	q ₂	0
q ₂	q ₁	1	q ₄	0
q ₃	q ₂	1	q ₁	1
q ₄	q ₄	1	q ₃	0

- a) 0101
- b) 1000
- c) 1010
- d) 1001

10. The following mealy machine outputs which of the following?



- a) 9's Complement
- b) 2's Complement
- c) 1's Complement
- d) 10's Complement

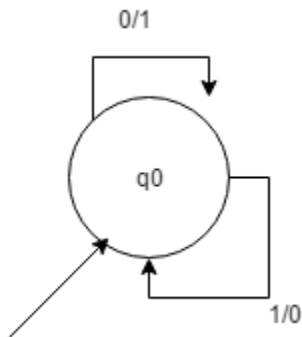
Answer: b

11. The major difference between Mealy and Moore machine is about:

- a) Output Variations
- b) Input Variations
- c) Both
- d) None of the mentioned

View Answer

12. Which of the following does the given Mealy machine represents?



- a) 9's Complement
- b) 2's Complement
- c) 1's Complement
- d) 10's Complement

13. Which one among the following is true?

A mealy machine

- a) produces a language
- b) produces a grammar
- c) can be converted to NFA
- d) has less circuit delays

Explanation: It does not produce a language or a grammar or can be converted to a NFA.

14. According to Moore circuit, the output of synchronous sequential circuit depend/s on _____ of flip flop

- a. Past state
- b. Present state

- c. Next state
- d. External inputs

15. Find the correct answer after, converting the following Mealy to Moore machine

Present State	Next State			
	a=0		a=1	
	State	Output	State	Output
->q ₁	q ₃	0	q ₂	0
q ₂	q ₁	1	q ₄	1
q ₃	q ₂	1	q ₁	1
q ₄	q ₄	1	q ₃	0

a)

Present State	Next State		Output
	a=0	a=1	
->q ₁	q ₃	q ₂₀	0
q ₂₀	q ₁	q ₄	0
q ₂₁	q ₁	q ₄	1
q ₃	q ₂₁	q ₁	0
q ₄	q ₄	q ₃	1

b)

Present State	Next State		Output
	a=0	a=1	
->q ₁	q ₃	q ₂₀	1
q ₂₀	q ₁	q ₄	1
q ₂₁	q ₁	q ₄	1
q ₃	q ₂₁	q ₁	0
q ₄	q ₄	q ₃	1

c)

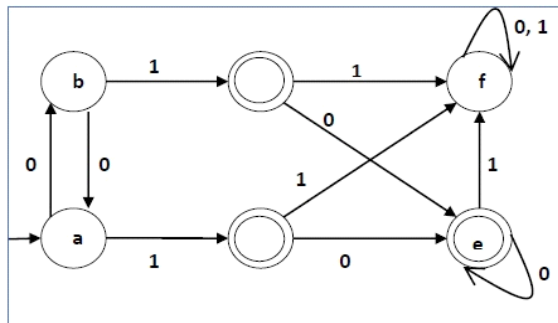
Present State	Next State		Output
	a=0	a=1	
->q ₁	q ₃	q ₂₀	1
q ₂₀	q ₁	q ₄	0
q ₂₁	q ₁	q ₄	1
q ₃	q ₂₁	q ₁	1

q_4	q_4	q_3	1
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d)

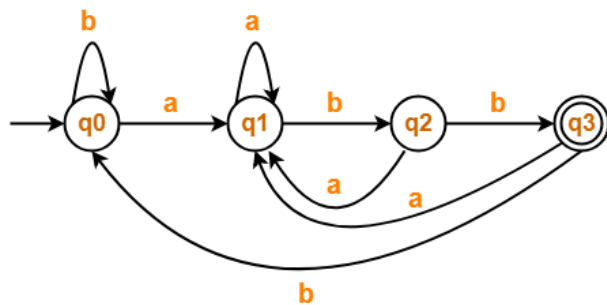
Present State	Next State		Output
	a=0	a=1	
$\rightarrow q_1$	q_3	q_{20}	1
q_{20}	q_1	q_4	0
q_{21}	q_1	q_4	1
q_3	q_{21}	q_1	0
q_4	q_4	q_3	1

Q: 1 How many states are require to construct a minimal dfa from the given DFA



a)2 b)3 c)4 d)5

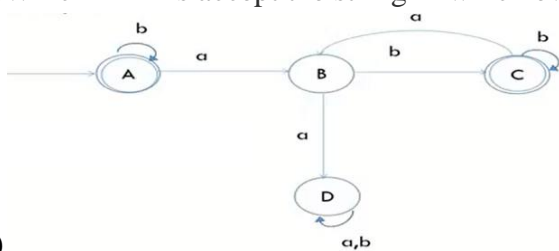
2.From the given DFA which string is accepted



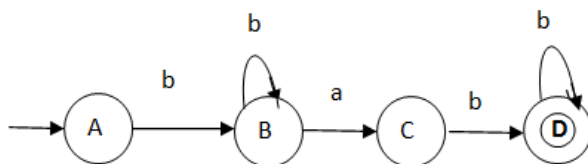
a) abbabb b) abbabba c) aabba d) aaba

ans a

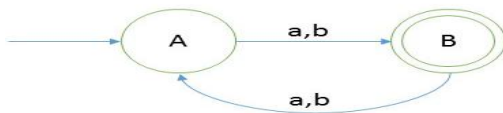
3. Which DFA is accept the string in which every a is followed by b where $\Sigma = \{a,b\}$.



a)



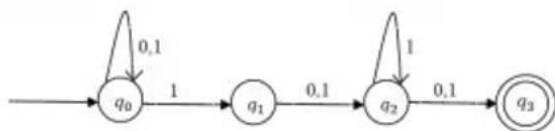
b) _____



c) _____

d) None of these

9.) Consider the finite automaton in the following figure. What is the set of reachable states for the input string 0011 ?



a. q0, q1, q2

b. q_0, q_1

c. q_0, q_1, q_2, q_3

d. q_3

13.) Given the language $L = \{aba, aa, baa\}$, which of the following strings are in L^* ?

1) abaabaaabaa

2) aaaabaaaa

3) baaaaabaaaab

4) baaaaabaa

a) 1, 2 and 3

b) 2, 3 and 4

c) 1, 2 and 4

d) 1, 3 and 4

14.) Let w be any string of length n in $\{0,1\}^*$. Let L be the set of all substrings of w . What is the minimum number of states in a non-deterministic finite automaton that accepts L ?

A) $n-1$

b) n

c) $n+1$

D) $2n-1$

A grammar $G = (V, T, P, S)$ in which V is

a) Set of variables

b) Set of terminals

c) Set of variables and terminals

d) None of these

Ans-A

A grammar $G = (V, T, P, S)$ in which T is

a) Set of variables

b) Set of terminals

c) Set of variables and terminals

d) None of these

Ans- B

Which of the following is more powerful?

- a) PDA
- b) Turing machine
- c) Finite automata
- d) Context sensitive language

Ans-B

Which of the following string is generated by the grammar

$S \rightarrow 0S1AB$

$A \rightarrow 4A$

$B \rightarrow SA$

- a) 0111
- b) 010101
- c) 00000
- d) None of these

Which of the following relates to Chomsky hierarchy?

- a) Regular < CFL < CSL < Unrestricted
- b) CFL < CSL < Unrestricted < Regular
- c) CSL < Unrestricted < CF < Regular
- d) None of the mentioned

Ans-a

A language is accepted by a push down automata if it is:

- a) regular
- b) context free
- c) both (a) and (b)
- d) none of the mentioned

Ans- B

Which of the following strings do not belong the given regular expression?

$(a)^*(a+cba)$

- a) aa
- b) aaa

- c) acba
- d) acbacba

Ans-d

Which of the following CFG's can't be simulated by an FSM ?

A. $S \rightarrow Sa \mid b$

B. $S \rightarrow aSb \mid ab$

C. $S \rightarrow abX, X \rightarrow cY, Y \rightarrow d \mid aX$

D. None of these

Ans-B

Regular Grammar is accepted by

- a. FA
- b. LBA
- c. Turing Machine
- d. All

Q. If $\Sigma = \{a,b\}$ and given productions are

$S \rightarrow XaaX$

$X \rightarrow aX \mid bX \mid \Lambda$

Then the above grammar defines the language expressed by _____ regular expression

- a. $(a+b)^*aa(a+b)^*$
- b. $(a+b)^*a(a+b)^*a$
- c. $(a+b)^*aa(a+b)^*aa$
- d. $(a+b)^*aba+b)^*$

Ans-A

Q. The languages which can not accept PDA _____

A. REGULAR LANGUAGES

B. CONTEXT FREE

C. CONTEXT SENSITIVE

D. NONE.

Ans- C

Q Regular grammar is

- a) Context free grammar
- b) Non context free grammar
- c) English grammar
- d) None of the mentioned

Ans- A

Regular expression are

- a) Type 0 language
- b) Type 1 language
- c) Type 2 language
- d) Type 3 language

Ans- A

L and $\sim L$ are recursive enumerable then L is

- a) Regular
- b) Context free
- c) Context sensitive
- d) Recursive

Ans-D

Regular expressions are closed under

- a) Union
- b) Intersection
- c) Kleene star
- d) All of the mentioned

Ans-d

How many strings of length less than 4 contains the language described by the regular expression $(x+y)^*y(a+ab)^*$?

- a) 7
- b) 10
- c) 12
- d) 11

Ans-D

Grammatical rules which involve the meaning of words are called:

- a. Semantics
- b. Syntactic
- c. Both a and b
- d. None of given

Ans- A

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

- a. Semantics
- b. Syntactic
- c. Both a and b
- d. None of given

Ans-B

The symbols in a grammar that can't be replaced by anything are called:

- a. Productions
- b. Terminals
- c. Non-terminals
- d. All of above

Ans-B

The symbols in a grammar that must be replaced by other Symbols are called:

- a. Productions
- b. Terminals
- c. Non-terminals
- d. None of given

Ans-C

1. A language is regular if and only if
 - a) accepted by DFA
 - b) accepted by PDA
 - c) accepted by LBA
 - d) accepted by Turing machine

Answer- a

2. Regular grammar is
 - a. context free grammar
 - b. non context free grammar
 - c. English grammar
 - d. none of the mentioned

Answer- a

3. Regular expression are

- a. Type 0 language
 - b. Type 1 language
 - c. Type 2 language
 - d. Type 3 language
4. Regular languages are closed under (closure properties)
- a. Concatenation
 - b. Union
 - c. Complement
 - d. All of the above

Answer- d

5. If L_1 is regular, then there exists some regular expression r_1 which describes it. Same for L_2 . Then: $L_1 \cup L_2 = L(r_1) \cup L(r_2) = r_1 + r_2$

$r_1 + r_2$ is a regular expression and therefore describes a regular language.

- a. True
- b. False

Answer : a

6. If $L_1 = \{a^n \mid n \geq 0\}$ and $L_2 = \{b^n \mid n \geq 0\}$ is regular then $L_3 = L_1.L_2 = \{a^m.b^n \mid m \geq 0 \text{ and } n \geq 0\}$ is also regular?

- a. False
- b True

Answer b

7. Which one of the following languages over the alphabet $\{0,1\}$ is described by the regular expression?

$(0+1)^*0(0+1)^*0(0+1)^*$

- a. The set of all strings containing the substring 00.
- b. The set of all strings containing at most two 0's.
- c. The set of all strings containing at least two 0's.
- d. The set of all strings that begin and end with either 0 or 1.

Answer c

8. A language is regular if it can be expressed in terms of

- a. Regular expression
- b. Type 0 Language
- c. English Grammar
- g. None of the above

Answer a

9. Which of the following pairs of regular expressions are equivalent?

- a. $1(01)^*$ and $(10)^*1$
- b. $x(xx)^*$ and $(xx)^*x$
- c. x^+ and $x^+x^{(*)}$
- d. All of the above mentioned

Answer d

10. Regular expressions are used to represent which language

- a) Recursive language
- b) Context free language
- c) Regular language
- d) All of these

Answer c

11. Which of the following operation can be applied on regular expressions?

- a) Union

- b) Concatenation
- c) Closure
- d) All of these

answer d

12. 7. Which of the following identity is wrong?

- a) $R + R = R$
- b) $(R^*)^* = R^*$
- c) $\epsilon R = R\epsilon = R$
- d) $\emptyset R = R\emptyset = RR^*$

Answer d

13. Which of the following statement is true?

- a) Every language that is defined by regular expression can also be defined by finite automata
- b) Every language defined by finite automata can also be defined by regular expression
- c) We can convert regular expressions into finite automata
- d) All of these

Answer d

14. Which of the following identity is true?

- a) $\epsilon + RR^* = R^* = \epsilon + R^*R$
- b) $(R_1R_2)^*R_1 = R_1(R_2R_1)^*$
- c) $R^*R^* = R^*$
- d) All of these

15. $(a+b)^*$ is equivalent to

- a) b^*a^*
- b) $(a^*b^*)^*$
- c) a^*b^*
- d) none of the mentioned

Answer b