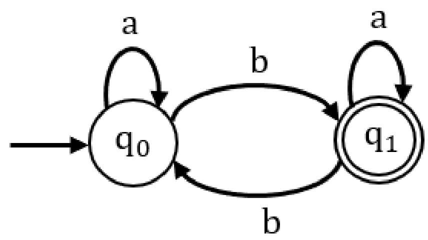
<u>Finite Automata, Regular Expressions and Regular Language</u>

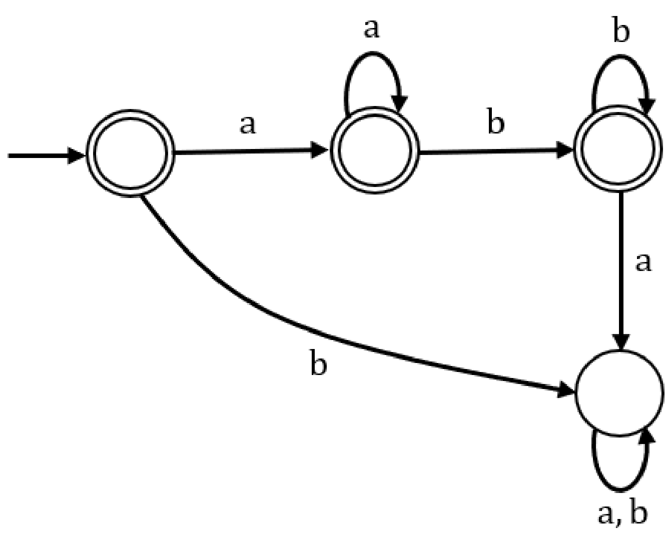
1) Consider the following DFA over ∑={a,b}



Select the correct option.

A. The DFA accept all strings which end with “a”.
B. The DFA accept all strings which has “b” as substring.
C. The DFA accept all strings which start with “b” and not end with “b”.
D. None of these

2) Consider the following DFA



Select the correct option.

A. The language accepted by the given DFA is a*b*.
B. The given DFA is a min DFA.
C. The given DFA accept all strings which don’t end with “a”.

D. None of these

3) Consider a set (S) of finite languages L i.e.,
S={L | L is a finite language over Σ={a,b}. Select the wrong option with respect to Set S.

A. S is closed under union.
B. S is closed under intersection.
C. S is closed under complement.
D. S is not closed under Kleene star.

4) Consider the following equalities and select the correct equality from the options.

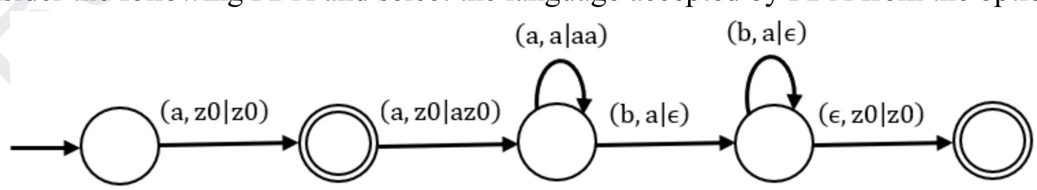
A. $\{\epsilon.\varphi\} = \varphi$
B. $\varphi + \epsilon = \epsilon.\ \varphi$
C. $\{\ \} = \{\epsilon\}$
D. $\epsilon + R = R$, where R is any regular expression

Answer: A

5) Select the correct option.

A. $\{\ \}^* = \{\epsilon\}$
B. $\{\varphi\} = \varphi$
C. $\varphi^+ = \varphi^*$
D. None of these

6) Consider the following PDA and select the language accepted by PDA from the options.



A. $\{a^n b^n \mid n > 0\} \cup \{a\}$
B. $\{a^n b^n \mid n \geq 1\} \cup \{a\}$

C. $\{a^{n-1} b^{n} \mid n > 0\} \cup \{a\}$
D. $\{a^{n} b^{n-1} \mid n > 0\} \cup \{a\}$

7) Select the regular language from the given options.
A. $L1=\{ww \mid w \in \{a,b\}\}$
B. $L2=\{ww^R \mid w \in \{a,b\}^*\}$
C. $L3=\{wCw^R \mid w \in \{a,b\}^*\}$
D. None of these

8) Let L is a language over $\Sigma=\{a,b\}$ such that $L=\{ab, bb\}$, select the complement of L from the given options.
A. $\overline{L} = \{w \mid w \in \{a,b\}^* \ \& \ |w| > 2\}$
B. $\overline{L} = \{w \mid w \in \{a,b\} \ \& \ |w| > 2\}$
C. $\overline{L} = \{w \mid w \in \{a,b\}^* \ \& \ |w| > 2\} \cup \{a, b, aa, ba\}$
D. None of these

9) Let $L1=a^*b^*$ and $L2=b^*a^*$, select the correct option with respect to L1 and L2.
A. $\overline{L1} = L2$
B. $L1 \cup L2 = \Sigma^*$
C. $(L1)^R = (L2)^R$
D. *None of these*

10) Consider the following language L over $\Sigma=\{a,b\}$ such that,
$L=\{w \in \{a,b\}^* \mid (|w| \bmod 2=0 \ \& \ w$ begins with "a") **OR** $(|w| \bmod 2=1 \ \& \ w$ begins with "b")$\}$

The number of states in the min DFA for the language L is _____

11) Consider the following languages L1 and L2, such that

$L1=\{ a^n b^n \mid n > 0\}$ and $L2=\{a^m b^n \mid m \neq n \; \& \; m,n >= 0\}$

Consider the following statements.

S1: $(L1 \cup L2)$ is a regular language.

S2: $(L1 \cup L2)$ is equal to $\sum^*$.

Select the correct option.

A. Both S1 and S2 are true.

B. S1 is true while S2 is false.

C. S1 is false while S2 is true.

D. Both S1 and S2 are false.

12) Consider the following statements.
S1: If L is a regular language then $L_A = \{xy : x \in L \; \& \; |y| < 3 \}$ is also a regular language.

S2: If L1 and L2 are two regular languages then $L_B = \{xy : x \in L1 \; \& \; y \in L2 \}$ is also a regular language.

Select the correct option.

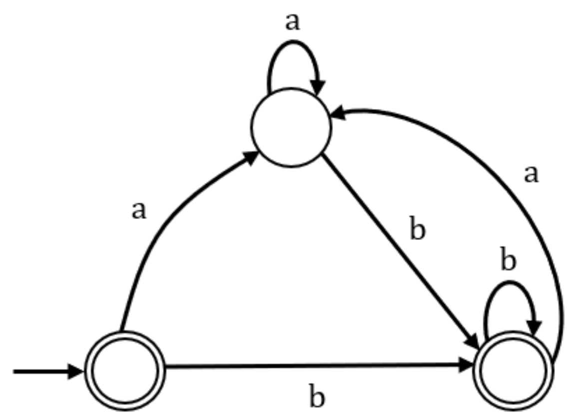
A. Both S1 and S2 are true.

B. S1 is true while S2 is false.

C. S1 is false while S2 is true.

D. Both S1 and S2 are false.

13) Consider the following finite automaton



Select the correct option for given FA.

A. The given FA is a min DFA
B. The regular expression for given FA is (a*b)*
C. The regular expression for given FA is (aa*b)*+ b*
D. None of these

14) Which one of the following doesn't generate the same language as the rest?
(i) (a+b)*a(a+b)*a(a+b)*

(ii) b * a b * a (a + b)*

(iii) (a + b)* a b* a b*

(iv) b * a (a + b)* a b*

(a) Only (ii)

(b) Only (iii)

(c) Only (iv)

(d) All regular expressions generate same language

15) Which one of the Regular Expression given defines the same language as defined by $R = (a + b)^* (aa + bb) (a + b)^*$?

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

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

(c) $(a (ba)^* (a + bb) + b (ab)^* (b + aa)) (a + b)^*$

(d) $(a (ba)^* (a + bb) + b (ab)^* (b + aa)) (a + b)^+$

16) Consider a language L such that
L={w ∈ {a,b}* & every "a" in w is immediately preceded and followed by "b" }

The number of states in min DFA which accepts L are ______

17) The total number of substrings present in "RAVI" is:

A. 7 B. 10 C. 11 D. 8

18) The total number of non-trivial substrings present in "RAVI" is:

A. 7 B. 8 C. 9 D. 11

19) The total number of substrings present in "RAAVI" is:

A. 8 B. 9 C. 15 D. 16

20) The total number of substrings present in "RAAAVI" is:

A. 18 B. 19 C. 21 D. 22

21) A Language is said to be regular iff

a. There exists a Right Linear Regular Grammar for L
b. There exists a Left Linear Regular Grammar for L
c. There exists a NFA with a single final state
d. There exists a DFA with a single final state
e. There exists a NFA without ε - move.

22) Finite automata can be used in

(a) Lexical Analysis
(b) Syntax Analysis
(c) Semantic Analysis
(d) None of these

23) Finite automata requires minimum ___________ number of stacks.

(a) 1
(b) 0
(c) 2
(d) None of the mentioned

24) 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

25) Consider this regular expression:

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

What is the language?

(a) All the strings ending with b
(b) Any string of 1 or more a's followed by single b
(c) Any string of 0 or more a's followed by single b
(d) None of above

26) Which one of the following is False?

I. A DFA can contain one initial state and one final state

II. A NFA can contain many initial states and many final states

III. A DFA can contain many initial states and many final states

IV. A NFA can contain one initial state and many final states

(a) I, II
(b) II, III
(c) I, IV
(d) III, IV

27) Find the number of states in minimal finite automata which accepts a language of strings whose length divisible by both '5' and '2' over $\Sigma = \{0, 1\}$

28) Consider this R.E. = (0 + 1)* (00 + 11)

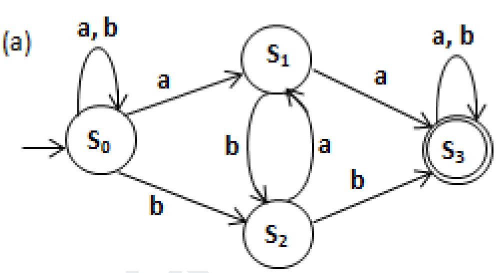
What will be the number of states in minimal DFA and NFA?

(a) DFA – 5, NFA – 5
(b) DFA – 5, NFA – 4
(c) DFA – 4, NFA – 4
(d) None

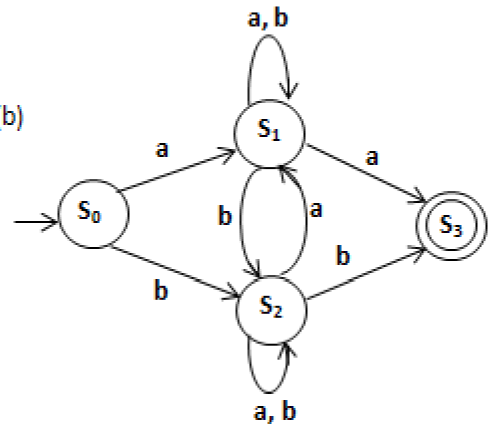
29) Consider R = (a + b)* (aa + bb) (a + b)*

Which of the following NFA recognizes the language defined by R?

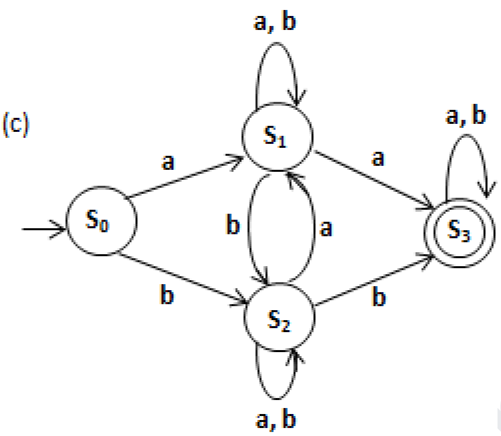
(a)



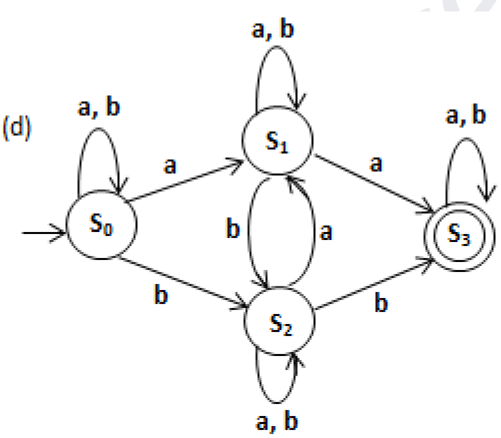
(b)



(c)

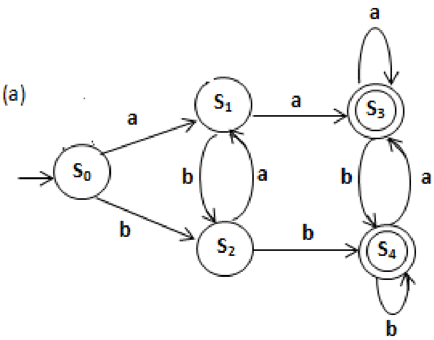


(d)

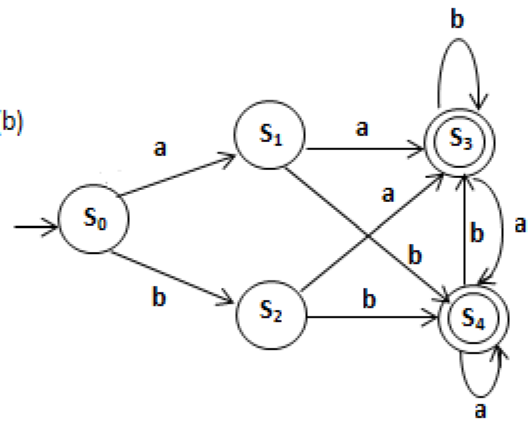


30) Which of the following DFA accepts same language accepted by R = (a + b)* (aa + bb) (a + b)*?

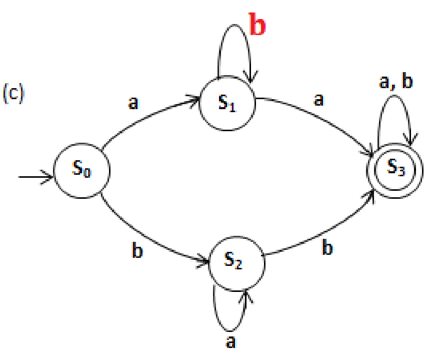
(a)



(b)

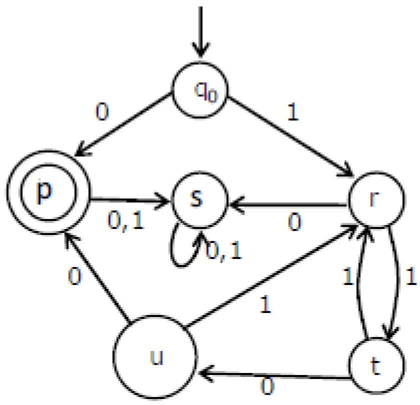


(c)



(d) None of above

31) Which of the following language is accepted by the following finite automata?



$(a)\ (110)^{*}01$

$(b)\ 0 + (1(11)^{*}10)^{+}0$

$(c)\ 0 + (1(11)^{*}101)^{+}0$

$(d)\ (11 + 10)^{*}01$

32) Number of trivial substrings in “GATE2013” are:

(a) 37 (b) 35
(c) 2 (d) 36

33) Let the string be defined over symbols a and b then what will be the number of states in minimal DFA, if every string starts and ends with different symbols?

(a) 5 (b) 4
(c) 3 (d) None

34) The total number of substrings present in “GATE” is: (a) 7 (b) 10
(c) 11 (d) 8

35) Let $\sum$= {a, b}, what are the number of states in minimal DFA, length of every string congruent to mod 5.

(a) 2
(b) 3
(c) 5
(d) None

36) A minimal DFA that is equivalent to a NDFA has:

A. Always more states
(b) Always less no. of states
C. Exactly 2^n states
(d) Sometimes more states

37) Consider following Regular Expression:

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

What is length of shortest string which is in both (i) & (ii)?

(a) 2
(b) 3
(c) 4
(d) None

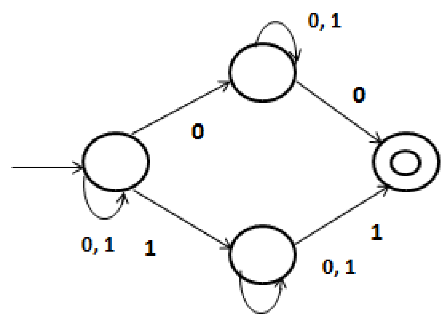
38) What are the number of states needed in minimal DFA, that accepts (1+1111)*, with 1 as alphabet.

(a) 5
(b) 4
(c) 1
(d) None

39) Let $\sum$= {a}, assume language, L= $\{a^{2012.K} / K> 0\}$, what is minimum number of states needed in a DFA to recognize L?

(a) $2^{2012} + 1$
(b) 2013
(c) 2^{2013}
(d) None

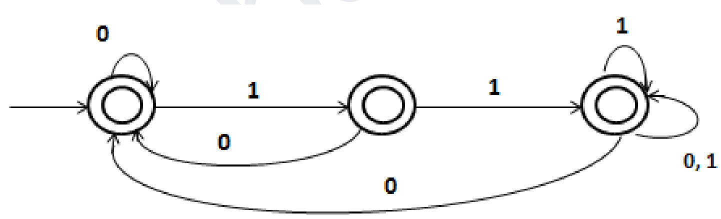
40) Consider the following NFA M over the alphabet {0,1}.



Let M_1 be the NFA obtained by interchanging final and non-final states of M. Let the language accepted by M be L and that accepted by M_1 be L_1. Choose correct statement:

(a) $L_1 = L$
(b) $L_1 \cap L_2 = \Phi$
(c) $L_1 \subseteq L_2$
(d) $L_1 = (0+1)^*$

41)



The DFA above accepts:
(a) The set of all strings containing two consecutive 1's (b) (0+1)*
(c) Set of all strings not containing two consecutive 1's
(d) Set of all strings containing two consecutive 0's

42) The minimal DFA of the above machine has:

(a) 1 State
(b) 5 States
(c) 3 States

(d) 2 States

43) Let r1 = 1 (0 + 1)* and r2 = 1 (1 + 0)+ r3 = 11*0

Which of the following is true?

(a) L (r1) ⊆ L (r2) and L(r1) ⊆ L(r3) (b) L (r1) ⊇ L (r2) and L(r2) ⊇ L(r3)
(c) L (r1) ⊇ L (r2) and L(r2) ⊆ L(r3) (d) L (r1) ⊆ L (r3) and L(r2) ⊆ L(r1)

44) Let n_1 and n_2 be the number of states in NFA and minimal DFA of a regular language. Then,

(a) $n_1 \geq n_2$
(b) $n_1 \leq n_2$
(c) $n_1 < n_2$
(d) $n_2 > n_1$

45) S_1: L is regular. Infinite union of L will also be regular i.e. ($L^0 \cup L^1 \cup L^2 \ldots$) S_2: L is regular. It's subset will also be regular.

(a) Both are true
(b) Both are false
(c) $S_1 \rightarrow T, S_2 \rightarrow F$
(d) $S_1 \rightarrow F, S_2 \rightarrow T$

46) Consider 2 scenarios:

C_1: For DFA ($\phi, \Sigma, \delta, q_o, F$),
if $F = \phi$, then $L = \Sigma^*$

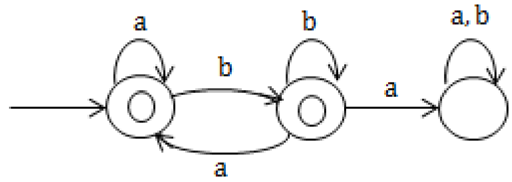
C_2: For NFA ($\phi, \Sigma, \delta, q_o, F$),
if $F = \phi$, then $L = \Sigma^*$

Where F = Final
states set ϕ
= Total
states set

(a) Both are true
(b) Both are False
(c) C_1 is true, C_2 is false
(d) C_1 is false, C_2 is true

Solution: Option (c)

47) Consider this FA:



How many strings will be there in the complement of the language accepted by this Finite Automata?

(a) Infinite
(b) 2
(c) 3
(d) 0

48) In Programming language, an identifier has to be a letter followed by any number of letters or digits. If L and D denotes the sets of letter and digits respectively, examine the correct expressions?

(a) $(L \cup D)^*$
(b) $(L \cdot D)^*$
(c) $L \cdot (L \cup D)^*$
(d) $L \cdot (L \cdot D)^*$

49) Total number of DFA possible with 2 states $q_0 \rightarrow$ start and non-final, $q_1 \rightarrow$ final over $\Sigma = \{a,b\}$ is

(a) 16
(b) 32
(c) 48
(d) 64

50) Which one of the following doesn't generate same language as rest?

(i) (a+b)*a(a+b)*a(a+b)*
(ii) b * a b * a (a + b)*
(iii) (a + b)* a b* a b*
(iv) b * a (a + b)* a b*

(a) Only (ii)
(b) Only (iii)

(c) Only (iv)
(d) All regular expressions generate same language

51) $L_1 = \{a^m\ b^n \mid m+n = \text{Even}\}$ $L_2 = \{a^m\ b^n \mid m\text{-}n = 4\}$

(a) L_1 is Regular, L_2 is Not Regular
(b) Both are Regular
(c) Both are Non- Regular
(d) L_2 is Regular, L_1 is Not Regular

52) Let r be any Regular Expression:
$S_1 \rightarrow r + \phi = r = \phi$
$+ r$ $S_2 \rightarrow r + \varepsilon = r =$
$\varepsilon + r$

(a) Both are true
(b) Both are False
(c) $S_1 \rightarrow T,\ S_2 \rightarrow F$
(d) $S_1 \rightarrow F,\ S_2 \rightarrow T$

53) Which one of the Regular Expression given defines the same language as defined by R = (a + b)* (aa + bb) (a + b)* ?

(a) (a (ba)* + b (ab)*) (a + b)*
(b) (a (ba)* + b (ab)*)* (a + b)*
(c) (a (ba)* (a + bb) + b (ab)* (b + aa)) (a + b)*
(d) (a (ba)* (a + bb) + b (ab)* (b + aa)) $(a + b)^+$

54) How many two state DFA's can be constructed over the alphabet $\Sigma = \{a, b\}$, with designated initial state?

(a) 4
(b) 16
(c) 64
(d) 128

55) How many 3 state DFA's with designated initial state can be constructed over the alphabet $\Sigma=\{a, b\}$_____.

56) Find the no. of DFA's that can be constructed over the alphabet Σ with 5 symbols, and with 10 states.

(a) $2^{50} \times 50^{5}$
(b) $2^{10} \times 10^{50}$
(c) $2^{5} \times 10^{50}$
(d) $2^{50} \times 50^{10}$

IMP

57) How many 2 state DFA's with designated initial state can be constructed over the alphabet $\Sigma =$
$\{a, b\}$ that accept empty language ϕ ?

(a) 4
(b) 16
(c) 20
(d) 24

58) How many 2 state DFA's with designated initial state can be constructed over the alphabet over the alphabet $\Sigma = \{a, b\}$ that accept universal language?

(a) 4
(b) 16
(c) 20
(d) 24

59) Which of the following statement(s) are true about NFA & DFA?

(i) NFA is more powerful than DFA but DFA is more efficient than NFA.
(ii) NFA will respond for only valid inputs and no need to respond for invalid inputs.
(iii) There is no concept of dead states and complement in NFA.
(iv) NFA is a parallel computing system where we can run multiple threads concurrently.

(a) only (i) & (ii) are true
(b) only (ii) & (iii) are true
(c) only (iii), (iv) & (i) are true
(d) All statements are true

60) Which of the following is a Regular language?

(a) $L_1 = \{wcw^R \mid w \in \{a, b\}^*\}$
(b) $L_2 = \{wcw^R \mid w,c \in \{a, b\}^*\}$
(c) $L_3 = \{ww^Rc \mid w \in \{a, b\}^*\}$
(d) $L_4 = \{cww^R \mid w \in \{a, b\}^*\}$

61) Given that a language $L = L_1 \cup L_2$, where L_1 and L_2 are two other languages. If L is known to be a regular language, then which of the following statements is necessarily TRUE?

(a) If L_1 is regular then L_2 will also be regular
(b) If L_1 is regular and finite then L_2 will be regular
(c) If L_1 is regular and finite the L_2 will also be regular and finite
None

62) Let L be the language represented by the regular expression $\Sigma^*0011\Sigma^*$ where $\Sigma = \{0, 1\}$.
What is the minimum number of states in a DFA that recognizes $\overline{L}$?

(a) 4
(b) 5
(c) 6
(d) 8

63) Choose the correct statement for the following regular expression over the symbols 0 & 1.
0(0+1)*0 + 1(0+1)*1

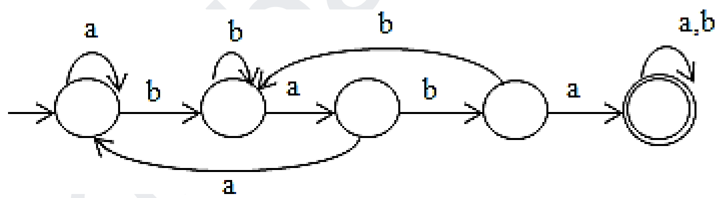
(a) To represent all strings over 0's and 1's

(b) To represent all strings which start with 0's and end with 1's

(c) To represent all strings which start and end with same symbol

(d) To represent all strings that starts and ends with 1's

64) Consider the following DFA:



Which of the following is true for the above DFA?

(a) It recognizes the strings which contains 'ababa' as substring

(b) It recognizes the strings which contains 'abbaba' as substring

(c) It recognizes the strings which contains 'abbabaa' as substring

(d) It recognizes the strings which contains 'baba' as substring

65) Which of the following regular expression generates the set of all strings not containing 'baa' as a substring over input alphabet {a, b}?

(a) a*(b*a)*

(b) a*b*ab

(c) a*baba*

(d) a*(ba+b)*

66) Identify the regular expression which denotes all strings of a's and b's where each string contains at least two b's.

(a) (a+b)*ba*b
(b) (a+b)*ba*ba
(c) (a+b)*ba*b(a+b)*
(d) None of these

67) Consider this R.E. = (0 + 1)* (00 + 11)
What will be the number of states in minimal DFA and NFA?

(a) DFA – 5, NFA – 5
(b) DFA – 5, NFA – 4
(c) DFA – 4, NFA – 4
(d) None

68) Number of states in minimal DFA to accept the language (a + aaa)* over Σ = {a, b} ?

(a) 1
(b) 2
(c) 3
(d) None

69) Consider the following statements:

S_1: $r_1 = (\varepsilon + a + b)^{100}$ represents strings of length strictly less than 100. S_2: $r_2 = (00 + 11 + 01 + 10)^* (0 + 1)$ represents all odd length strings.

(a) Both are True
(b) Both are False
(c) $S_1 \rightarrow$ True, $S_2 \rightarrow$ False
(d) $S_1 \rightarrow$ False, $S_2 \rightarrow$ True

70) What will be number of states in DFA to represent the regular expression r1 = (01 + 1)* (ε + 0)?

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

71) Let Prefix(u) = {x | u = xy}

Let u be a string of length n. Total number of Prefixes possible for u will be

(a) n
(c) n + 1
(b) n – 1
(d) None

72) Consider this:

S_1: Language L and its complement $\bar{L}$ will have same number of states in minimal DFA. S_2: Language L and its complement $\bar{L}$ will have same number of states in minimal NFA.

(a) Both are True
(b) Both are False
(c) $S_1 \rightarrow T, S_2 \rightarrow F$
(d) $S_1 \rightarrow F, S_2 \rightarrow T$

73) Let L be a Finite language in which maximum length of string is n and minimum length is m(m < n). Minimum number of states in the DFA will be:
(a) m + 1 (b) n + 1
(c) n + 2 (d) m + 2

74) Let w be any string of length n in (0, 1)*. Let L be set of all sub-strings of w. Minimum number of states in NFA that accepts L?
(a) n (b) n + 1
(c) n + 2 (d) n – 1

75) Consider these:

S_1: Kleene closure of a language is always infinite.
S_2: Concatenation of infinite language and finite language is always infinite.

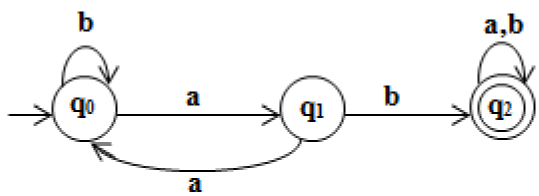
(a) Both are True
(b) Both are False
(c) $S_1 \rightarrow T, S_2 \rightarrow F$
(d) $S_1 \rightarrow F, S_2 \rightarrow T$

76) Consider:

S_1: Every regular language can be accepted by NFA with only one Final state S_2: There is a language for which $L = L^*$

(a) Both are True
(b) Both are False
(c) $S_1 \rightarrow T, S_2 \rightarrow F$
(d) $S_1 \rightarrow F, S_2 \rightarrow T$

77) Regular Expression for this DFA:



(a) (b + aa)* ab(a + b)*
(b) b*a (ab*a)* b(a + b)*
(c) Both (a) and (b)
(d) b* ab(a + b)*

78) Consider this regular expression:

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

What is the language?

(a) All the strings ending with b
(b) Any string of 1 or more a's followed by single b
(c) Any string of 0 or more a's followed by single b
(d) None of above

79) Consider 2 regular expression:

i. $\phi^* + a^+ + b^+ + (a + b)^+ \rightarrow r1$
ii. $\phi^+ + a^* + b^* + (a + b)^* \rightarrow r2$

(a) L(r1) = L(r2)
(b) $L(r1) \subseteq L(r2)$
(c) $L(r1) \supseteq L(r2)$
(d) None of above

80) Consider this regular expression:

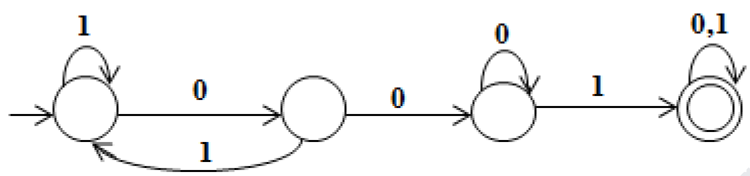
r = (a*b)* + (b*a)*

This is equivalent to

(a) $(a + b)^*$
(b) $(a + b)^* \cdot (ab)^+ + (a + b)^* (ba)^+$
(c) $(a + b)^*a + (a + b)^*b$
(d) None of above

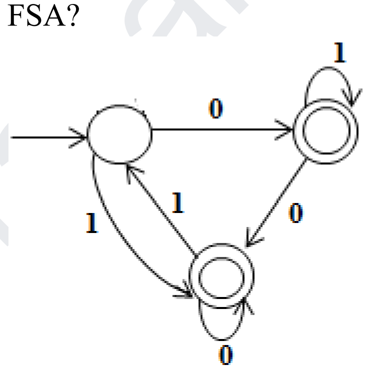
IMP

81) Consider this DFA:



S denotes set of seven bit binary strings in which first, fourth, last bit is 1. Number of strings in L are:
(a) 5 (b) 6
(c) 7 (d) 8

82) Which string is not accepted by FSA?



(a) 00111
(b) 01010
(c) 00110
(d) 11010

83) Can a Deterministic Finite State machine simulate a Non-Deterministic Finite State machine?

(a) No
(b) Yes
(c) Sometimes
(d) Depends on NFA

84) Consider this:

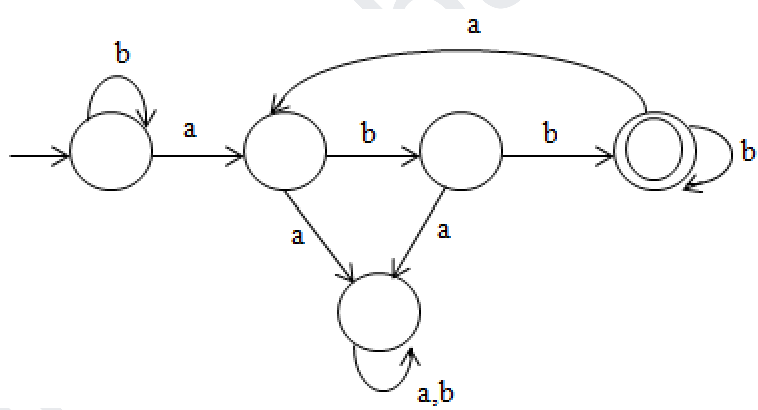
i. $b^*a^* \cap a^*b^* = a^* \cup b^*$
ii. $a^*b^* \cap c^*d^* = \phi$

(a) Both are True
(b) Both are False
(c) (i) is True and (ii) is False
(d) (i) is False and (ii) is True

85) Minimum number of states in DFA over $\Sigma = \{0, 1\}$ with each string contains odd number of 0's or odd number of 1's.

(a) 3
(b) 4
(c) 5
(d) 6

86) Consider this FSM 'M' :



Language is

(a) {w ∈ (a+b)* | every a in w is followed by exactly 2 b's}
(b) {w ∈ (a+b)* | every a in w is followed by at least 2 b's}
(c) {w ∈ (a+b)* | w has substring abb}
(d) {w ∈ (a+b)* | w does not contain 'aa' as substring}

87) How many two state DFA's exists over alphabet (0, 1) where X and Y are two states and X is always initial state, Y is always final.

(a) 16
(b) 20
(c) 32
(d) 64

88) How many DFA’s exist over alphabet (0, 1) of two states X and Y where both states are always non-final?

(a) 16 (b) 20
(c) 32 (d) 64

89) How many total numbers of substrings are possible out of the string abbbccd?

(a) 25 (b) 27
(c) 28 (d) 29

90) 10. Given $\Sigma = \{A – Z, 0 – 9\}$ be an alphabet where w is a string defined over the alphabet. Let w = GATE2016, then number of substrings and number of trivial substrings is:

(a) 37, 39 (b) 37, 2
(c) 39, 37 (d) 2, 37

91) 11. Given a string w = “GRAMMAR”, the number of prefixes & suffixes respectively are:
(a) 7, 7 (b) 8, 8
(c) 7, 8 (d) 8, 7

92) 12. Given $\Sigma = \{a, b\}$, which of the following statement is true?

(i) $\Sigma^* \cup \Sigma^+ = \Sigma^+$
(ii) $\Sigma^* \cap \Sigma^+ = \Sigma^*$
(iii) $\Sigma^* \cdot \Sigma^+ = \Sigma^+ \cdot \Sigma^* = \Sigma^+$
(iv) $\Sigma^+ \cdot \Sigma^+ = \Sigma^+$

(a) Only (i), (ii) & (iii) (b) Only (i), (ii) & (iv)
(c) Only (iii) & (iv) (d) All of the above

93) 15. Which one of the following is/are the Finite Automata with outputs?

(a) DFA (b) NFA
(c) ∈-NFA (d) Moore machine
(e) Mealey machine

94) For a given NFA with n state, the maximum number of state possible in the equivalent DFA is

(a) 1 (b) n
(c) n + 1 (d) 2n

95) The minimal finite automata that accepts all strings of a’s & b’s, where the number of a’s is atleast ‘n’ contains number of states.
(a) n – 1 (b) n
(c) n + 1 (d) n + 2

96) Consider the minimal Finite automata that accepts all the strings of a’s & b’s where each string contains

(i) exactly 5 a’s
(ii) atmost 5 a’s

The No. of states in each case respectively are:

(a) 6, 6 (b) 7, 7

(c) 6, 7 (d) 7, 6

97) 6. Consider the Minimal Finite Automata that accept all the strings of a’s & b’s where no. of a’s is congruent to 2 mod 3. The no. of states in this automata is
(a) 4 (b) 3
(c) 2 (d) 1

98) Construct the minimal finite automata that accept all the strings of 0's & 1's is where the integer equivalent is congruent to 1(mod 4). What is the no. of states in minimal finite automata?

(a) 4
(b) 3
(c) 2
(d) 1

IMP 99) Construct the minimal finite automata that accept all the strings of 0's and 1's where the integer equivalent of the binary string is congruent to 3 mod 6. What is the number of states in the minimal finite automata?

(a) 6
(b) 5
(c) 4
(d) 3

100) Given $\Sigma = \{0, 1\}$, the minimal finite automata that accepts all the strings from the given alphabet where the integer equivalent of the binary string is congruent to 5(mod 8) has ___________no. of states.

(a) 8
(b) 7
(c) 5
(d) 4

101) Given language $L = \{a^m b^n c^p \mid m,n,p \geq 0\}$, $\Sigma = \{a, b, c\}$. Find the number of states in minimal finite automata of the above language.

(a) 3
(b) 4
(c) 5
(d) 6

102) Given L = $\{a^m b^n c^p d^q \mid m,n,p,q \geq 0\}$, $\Sigma = \{a, b, c, d\}$, find the number of states in the minimal finite automata of the language.

(a) 3
(b) 4
(c) 5
(d) 6

103) Given a language L = $\{a^m b^n \mid m\geq 0, n\geq 2\}$, $\Sigma=\{a, b\}$. Find the number of states in the minimal finite automata that accepts the above language.

(a) 3
(b) 4
(c) 5
(d) 6

104) L = $\{a^m b^n \mid m\geq 0, n\geq 2016\}$, $\Sigma=\{a, b\}$. Find the no. of states in the minimal finite automata that accepts this language.

(a) 2016
(b) 2017
(c) 2018
(d) 2019

105) The number of states in MFA that accept all the strings of a's & b's where each string contain odd occurrence of the substring ab is

(a) 4
(b) 5
(c) 6
(d) 7

106) The number of states in MFA that accepts all the strings of a's & b's where each string contains even occurrences of substring ab

(a) 4
(b) 5
(c) 6
(d) 7

107)

What is the number of final states in the minimal finite automata, where $\Sigma = \{a, b\}$, if every string start with "aa" and length of string is not congruent to 0(mod 4)

(a) 4
(b) 3
(c) 2
(d) 1