TOC Unit 1 MMCQ QB - bdfb

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MCQ on Unit- 1

1. Meera is asked to make an automaton which accepts a given string for all the occurrence of '1001' in it. How many number of transitions and States would Meera use such that, the string processing application works? *

a. 9, 5
b. 11,5
c. 12,8
d. 15,7

Ans: a
Explanation : start with intial state with string q0-q1-q2-q3-q4 (5 states) required to read 1-0-0-1 string, and to show all transition 0& 1 total 9 transtitions required as NFA.

2. From the given table, δ*(q0, 001) =? *

Q	Δ(q,0)	δ(q,1)
q0	{q0}	{q0, q1}
q1	{q2}	{q2}
q2	{q3}	{q3}
q3	Φ	Φ

a. {q0,q1}
b. {q0, q1, q2}
c. {q2, q1}
d. {q3, q1, q2, q0}

Ans: a
Explanation: δ*(**q0, 0**01) => (**q0,0**1)=> (q0,1)=> (q0,q1)

3. The major difference between a moore and mealy machine is that *
a. output of the former depends on the present state and present input
b. output of the former depends only on the present state
c. output of former depends only on the present input
d. all of these

Ans:. B
Explanation: in Moore machine output is only depends on present state

4. DFA can be expressed as a 5 tuple(Q, Σ, δ, q0, F), where δ is the transition function defined as ___?
a. δ: Σ → Q
b. δ: Q x Q → Σ
c. δ: Q → Q
d. δ: Q x Σ → Q

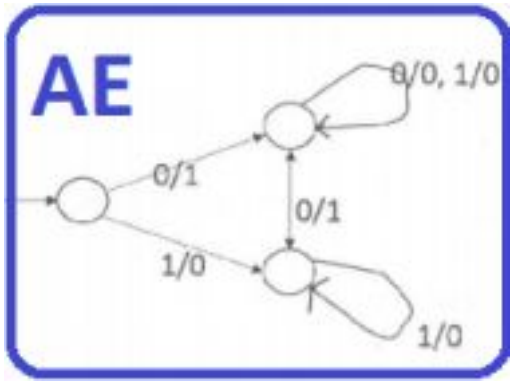
Ans:. D
Explanation: In DFA transition function can calculated as δ: Q x Σ → Q , If you know current state and current input then there is obly one next state.
5. Given the language L = {ab, aa, baa}, which of the following strings are

in L* ? 1) abaabaaabaa 2) aaaabaaaa 3) baaaaabaaaab 4) baaaaabaa *

a. 1, 2, 3
b. 2, 3, 4
c. 1, 2, 4
d. 1, 3, 4

Ans:. C
Explanation: Any combination of strings in set {ab, aa, baa} will be in L*. 1) "abaabaaabaa" can be partitioned as a combination of strings in set {ab, aa, baa}. The partitions are "ab aa baa ab aa"
2) "aaaabaaaa" can be partitioned as a combination of strings in set {ab, aa, baa}. The partitions are "aa ab aa aa"
3) "baaaaabaaaab" cannot be partitioned as a combination of strings in set {ab, aa, baa}
4) "baaaaabaa" can be partitioned as a combination of strings in set {ab, aa, baa}. The partitions are "baa aa ab aa"

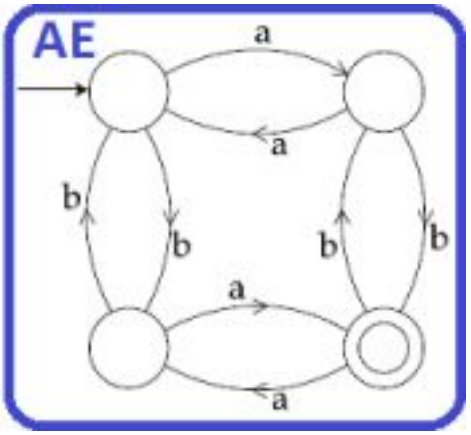
6. Find out the purpose of FSM (Finite State Machine) machine pictured in the figure



a. Complements a given bit pattern
b. Find 2's complement of a given bit pattern by 1
c. Increments a given bit pattern by 1
d. Changes the sign bit
Ans:. C
Explanation: Diagram shows input o's and 1's are incremented by 1 at

final state **7. The finite state machine given in figure below recognizes**

: *



a. Any string of odd number of a's
b. Any string of odd number of b's
c. Any string of even number of a's and odd number of b's
d. Any string of odd number of a's and odd number of b's
Ans:. D
Explanation: as in diagram while we are starting from intial state and when reach to final state reading a's and b's then we will get odd number of a's and b's

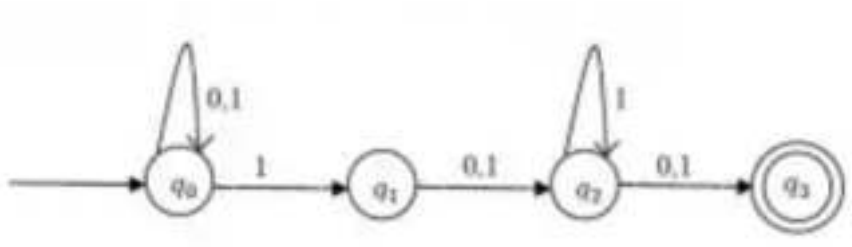
8. How many minimum states are required in a DFA to find whether a given binary string has odd number of 0's or not, there can be any number of 1's.
a. 1
b. 2
c. 3
d. 4

Ans:. B
Explanation: to make number of 0's odd, we have to take two state q0 and q1, q0 is intial state and q1 will be final state, so start with q0 on reading symbol 0 reach to final state always we will get odd number of 0.

9. Which of the following is not true?

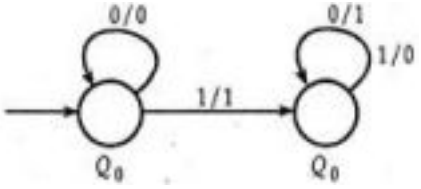
a. Power of deterministic automata is equivalent to power of non-deterministic automata. b. Power of deterministic pushdown automata is equivalent to power of non-deterministic pushdown automata.
c. Power of deterministic Turing machine is equivalent to power of non-deterministic Turing machine
d. All the above
Ans:. b
Explanation: DPDA and NPDA are different from each other so they are not equivalent

10. 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. q0,q1
c. q0,q1,q2,q3
d. q3

Ans:. A
Explanation: d(**q0,0**011) => d(**q0,0**11) => d(**q0,1**1) =>d (q1,1) => (q2)
we want reachble path e-closure of q2={q0,q1,q2}
11. The following diagram represents a finite state machine which takes as input a binary number from the least significant bit. *



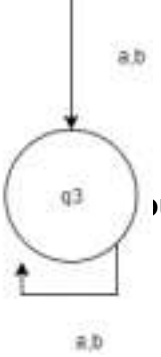
a. It computes 1's complement of the input number
b. It computes 2's complement of the input number
c. It increments the input number
d. It decrements the input number

Ans: B
Explanation: In diagram, we have to keep reading all number of 0's until get first1, once get first 1 we have to keep that as it is, after that if read 0 replace it with1 and if reads 1 replace it with 0. this is the logic for 2's complement of number

12. Fill in the missing blank in the given Transition Table:Language L= {x ∑= {0,1} |x accepts ϵ all the binary strings not divisible by 3} *

	0	1
Q0	Q0	Q1
Q1	Q2	Q0
Q2	_____	Q2

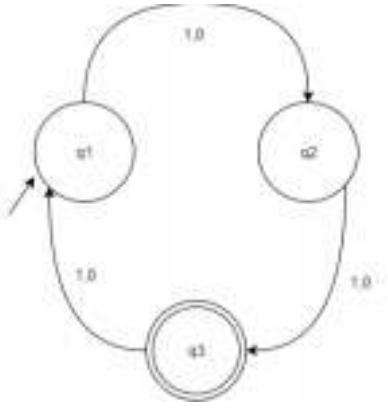
a. Q0
b. Q1
c. Q2
d. No Transition
Ans: B
Explanation : while state is Q0 and input is 1, reminder will be 1 so, state is Q1 (Apply **binary strings not divisible by 3 logic)**



13. . L= {x ∑= {a ...uld be notated as fina

a. q1
b. q2
c. q1,q2
d. q3
Ans: B
Explanation: According to the given language, q2 Is to become the final/acceptance state in order to satisfy.

14. Which of the following will the given DFA won't accept? *



a. ε
b. 11010
c. 10001010
d. String of letter count 11

Ans: A
Explanation. There is no empty string that rech to final state, thus given DFA won't accept **ε**

15. ε-closure of state is combination of self state and _____ *
a. Initial state
b. ε- reachable state
c. Final state
d. All
Ans: A

Explanation. E-clsousre means state having transition with input ε called ε- reachable state

16. If L is DFA-regular, L' is
a) Non regular
b) DFA-regular
c) Non-finite
d) None of the mentioned

Answer: b
Explanation: This is a simple example of a closure property: a property saying that the set of DFA regular languages is closed under certain operations.

17. Finite state machine are not able to recognize Palindromes because: a) Finite automata cannot deterministically find the midpoint
b) Finite automata cannot remember arbitarily large amount of data
c) Even if the mid point is known, it cannot find whether the second half matches the first d) All of the mentioned
Answer: d
Explanation: It is the disadvantage or lack of property of a DFA that it cannot remember an arbitrarily such large amount of data which makes it incapable of accepting such languages like palindrome, reversal, etc.

18. The Non- Kleene star operation accepts the following string of finite length over set A= {0,1} | where string S contains even number of 0 and 1

a) 01, 0011, 010101
b) 0011, 11001100
c) ε , 0011, 11001100
d) ε , 0011, 11001100

Answer : b
Explanation: The Kleene star of A, denoted by A*, is the set of all strings obtained by concatenatingzero or more strings from A.

19. Given Σ = {a,b} , L = { X ϵ Σ* | X is a string combination } Σ^4 represents which among the following
a) {aa, ab, bb, ba }
b) {aaaa, abab, ε, abaa, aabb}
c) {aaa, aab, aba, bbb}
d) All of mentioned
Answer : b
Explanation: ∑* represents any combination of the given set while ∑x represents the set of combinations with length x where x I. ϵ

20. The number of elements in the set for the language L = { x ϵ (Σ^r)* | length if x is at most 2} and Σ = {0,1} is ------

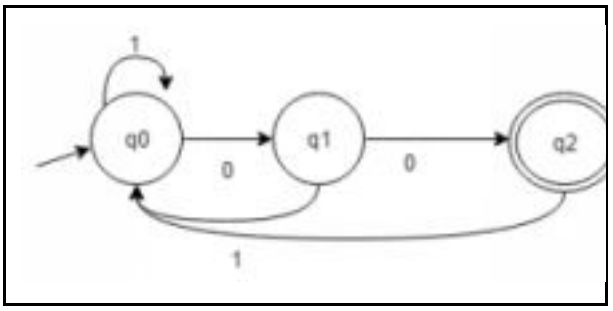
a) 7
b) 6
c) 8
d) 5
Answer : a
Explanation: Σ^r = {1,0} and a kleen* operation would lead to the following set = COUNT (ε , 0,1,00,11,01,10 }=7

21. Under which of the following operation, NFA is not closed?
a) Negation
b) Kleene
c) Concatenation
d) None of the mentioned
Answer: d
Explanation: NFA is said to be closed under the following operations:
a) Union
b) Intersection
c) Concatenation
d) Kleene
e) Negation
22. Which of the following is an application of Finite Automaton?
a) Compiler Design
b) Grammar Parsers
c) Text Search
d) All of the mentioned

Answer: d
Explanation: There are many applications of finite automata, mainly in the field of Compiler Design and Parsers and Search Engines.

23. Given a NFA with N states, the maximum number of states in an equivalent minimized DFA is at least
a) N^2
b) 2^N
c) 2N
d) N!
Answer: b
Explanation: as per defintion of DFA , if NFA has N sates then DFA has power set of that states, so answer is 2^N

24. Predict The number of transitions required to automate the following language using only 3 states: L= {w | w ends with 00}
a) 3
b) 2
c) 4
d) Cannot be said
Answer: a
Explanation:



25. For following language how many total number of states are required to build DFA: L= {w | w has exactly 2 a's and at least 2 b's}
a) 10
b) 11
c) 12
d) 13

Answer: a
Explanation: We need to make the number of a as fixed i.e. 2 and b can be 2 or more. Thus, using this condition a finite automata can be created using 1 states.

26. Transition function maps.
a) Σ * Q -> Σ
b) Q * Q -> Σ
c) Σ * Σ -> Q
d) Q * Σ -> Q
Answer:d
Explanation: Inputs are state and input string output is states.

27. Extended transition function is .
a) Q * Σ* -> Q
b) Q * Σ -> Q
c) Q* * Σ* -> Σ
d) Q * Σ -> Σ
Answer: a
Explanation: This takes single state and string of input to produce a state.

28. δ*(q,ya) is equivalent to .
a) δ((q,y),a)
b) δ(δ*(q,y),a)
c) δ(q,ya)
d) independent from δ notation
Answer:b
Explanation: First it parse y string after that it parse a.

29. Languages of a automata is

a) If it is accepted by automata
b) If it halts
c) If automata touch final state in its life time
d) All language are language of automata
Answer:a
Explanation: If a string accepted by automata it is called language of automata.

30. Language of finite automata is.
a) Type 0
b) Type 1
c) Type 2
d) Type 3
Answer:d
Explanation: According to Chomsky classification.

31. Finite automata requires minimum how many number of
stacks. a) 1
b) 0
c) 2
d) None of the mentioned
Answer:b
Explanation: Finite automata doesn't require any stack operation .
32. Number of final state require to accept Φ in minimal finite automata.
a) 1
b) 2
c) 3
d) None of the mentioned
Answer:d
Explanation: No final state requires.

33. How many DFA's exits with two states over input alphabet {0,1} ?
a) 16
b) 26
c) 32
d) 64
Answer:d
Explanation: Number of DFA's = $2^n * n^{(2*n)}$.

34. The basic limitation of finite automata is that
a) It can't remember arbitrary large amount of information.
b) It sometimes recognize grammar that are not regular.
c) It sometimes fails to recognize regular grammar.
d) All of the mentioned
Answer:a
Explanation:Because there is no memory associated with automata.

35. Number of states require to simulate a computer with memory capable of storing '3' words each of length '8'.

a) $3 * 2^8$

b) $2^{(3*8)}$

c) $2^{(3+8)}$

d) None of the mentioned

Answer:b

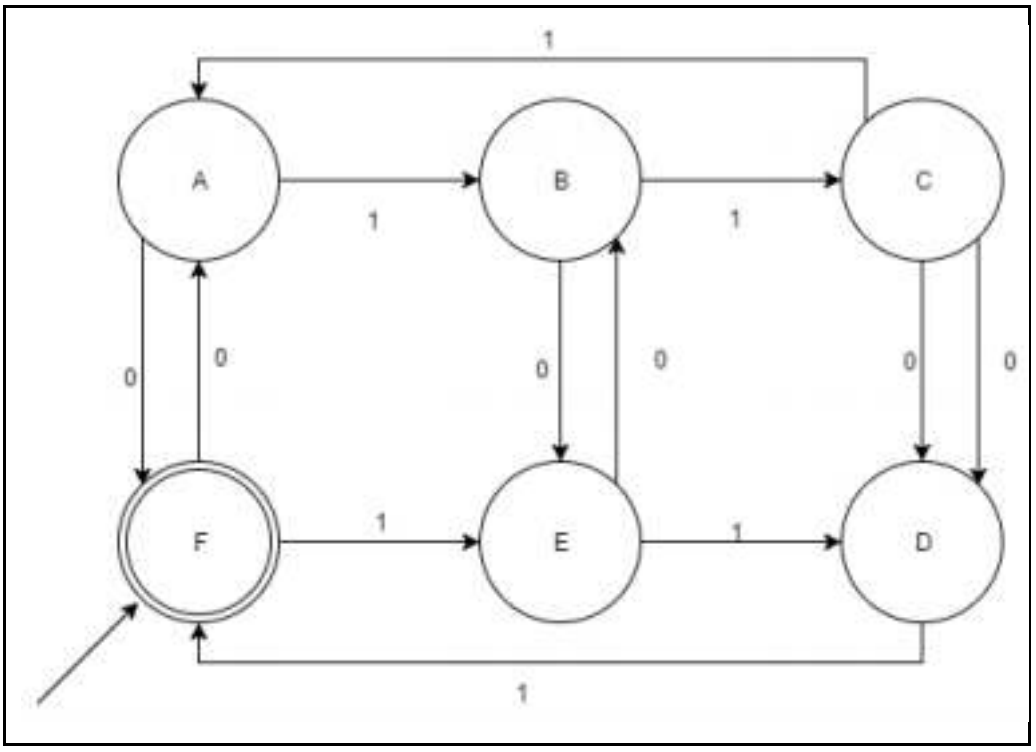
Explanation: $2^{(m*n)}$ states requires .

36. According to the 5-tuple representation i.e. FA= {Q, ∑, δ, q, F}
Statement 1: q Q'; Statement 2: F Q ϵ ϵ
a) Statement 1 is true, Statement 2 is false
b) Statement 1 is false, Statement 2 is true
c) Statement 1 is false, Statement 2 may be true
d) Statement 1 may be true, Statement 2 is false
Answer: b
Explanation: Q is the Finite set of states, whose elements i.e. the states constitute the finite automata.

37. δˆ tells us the best:
a) how the DFA S behaves on a word u
b) the state is the dumping state
c) the final state has been reached
d) Kleene operation is performed on the set
Answer: a
Explanation: δ or the Transition function describes the best, how a DFA behaves on a string where to transit next, which direction to take.

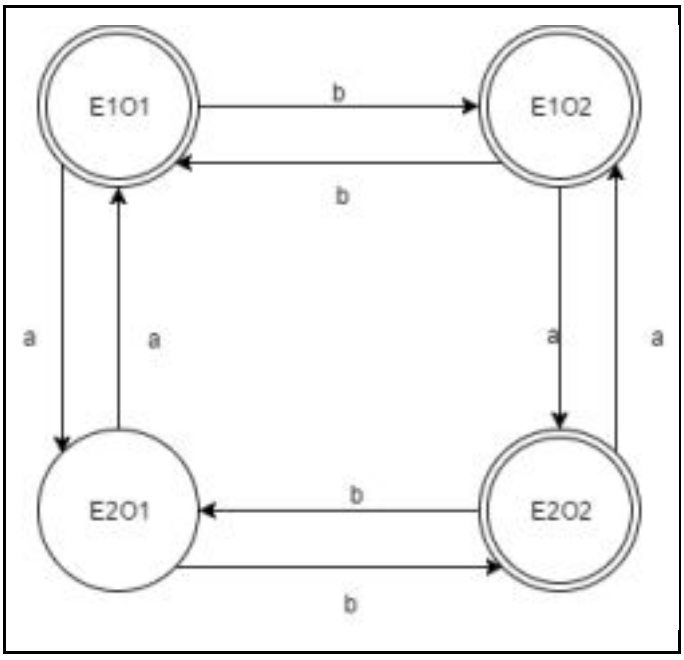
38. For a DFA accepting binary numbers whose decimal equivalent is divisible by 4, what are all the possible remainders?
a) 0
b) 0,2
c) 0,2,4
d) 0,1,2,3
Answer: d
Explanation: All the decimal numbers on division would lead to only 4 remainders i.e. 0,1,2,3 (Property of Decimal division).

39. Which of the following x is accepted by the given DFA (x is a binary string ∑= {0,1})?



a) divisible by 3
b) divisible by 2
c) divisible by 2 and 3
d) divisible by 3 and 2
Answer: d
Explanation: The given DFA accepts all the binary strings such that they are divisible by 3 and 2.Thus, it can be said that it also accepts all the strings which is divisible by 6.

40. Given:
L1= {x ∑*|x contains even no's of 0's} ϵ
L2= {x ∑*|x contains odd no's of 1's} ϵ
No of final states in Language L1 U L2?
a) 1
b) 2
c) 3
d) 4
Answer: c
Explanation:



41. The maximum number of transition which can be performed over a state in a DFA? ∑= {a, b, c}

a) 1

b) 2

c) 3

d) 4

Answer: c

Explanation: The maximum number of transitions which a DFA allows for a language is the number of elements the transitions constitute.

42. Which of the following options is correct?

Statement 1: Initial State of NFA is Initial State of DFA.

Statement 2: The final state of DFA will be every combination of final state of NFA. a) Statement 1 is true and Statement 2 is true

b) Statement 1 is true and Statement 2 is false

c) Statement 1 can be true and Statement 2 is true

d) Statement 1 is false and Statement 2 is also false

Answer: a

Explanation: Statement 1 and 2 always true for a given Language.

43. If NFA of 6 states excluding the initial state is converted into DFA, maximum possible number of states for the DFA is ?

a) 64

b) 32

c) 128

d) 127
Answer: c
Explanation: The maximum number of sets for DFA converted from NFA would be not greater than 2n.

44. NFA, in its name has 'non-deterministic' because of :
a) The result is undetermined
b) The choice of path is non-deterministic
c) The state to be transited next is non-deterministic
d) All of the mentioned
Answer: b
Explanation: Non deterministic or deterministic depends upon the definite path defined for the transition from one state to another or undefined(multiple paths).

45. Given Language L= {x {a, b}*|x contains aba as its substring} ϵ
Find the difference of transitions made in constructing a DFA and an equivalent NFA? a) 2
b) 3
c) 4
d) Cannot be determined.
Answer: a
Explanation: The individual Transition graphs can be made and the difference of transitions can be determined.

46. Which of the following option is correct?
a) NFA is slower to process and its representation uses more memory than DFA b) DFA is faster to process and its representation uses less memory than NFA c) NFA is slower to process and its representation uses less memory than DFA d) DFA is slower to process and its representation uses less memory than NFA Answer: c
Explanation: NFA, while computing strings, take parallel paths, make different copies of input and
goes along different paths in order to search for the result. This creates the difference in processing speed of DFA and NFA.

47. What is the relation between DFA and NFA on the basis of computational power? a) DFA > NFA
b) NFA > DFA
c) Equal
d) Can't be said

Answer: c
Explanation: DFA is said to be a specific case of NFA and for every NFA that exists for a given language, an equivalent DFA also exists.

48. Subset Construction method refers to:
a) Conversion of NFA to DFA
b) DFA minimization
c) Eliminating Null references
d) ε-NFA to NFA
Answer: a
Explanation: The conversion of a non-deterministic automata into a deterministic one is a process we call subset construction or power set construction.

49. If L is a regular language, L^c and L^r both will be:
a) Accepted by NFA
b) Rejected by NFA
c) One of them will be accepted
d) Cannot be said
Answer: a
Explanation: If L is a regular Language, L^c and L^r both are regular even.

50. Which of the following is an application of Finite Automaton?
a) Compiler Design
b) Grammar Parsers
c) Text Search
d) All of the mentioned
Answer: d
Explanation: There are many applications of finite automata, mainly in the field of Compiler Design and Parsers and Search Engines.