1. All the regular languages can have one or more of the following descriptions:
   i) DFA ii) NFA iii) e-NFA iv) Regular Expressions
   Which of the following are correct?
   a) i, ii, iv
   b) i, ii, iii
   c) i, iv
   d) i, ii, iii, iv. ANS:-D
2. Which of the technique can be used to prove that a language is non regular?
   a) Ardens theorem
   b) Pumping Lemma
   c) Ogden's Lemma
   d) None of the mentioned ANS:-B
3. Which of the following language regular?
   a) $\{a^ib^i|i>=0\}$
   b) $\{a^ib^i|0<i<5\}$
   c) $\{a^ib^i|i>=1\}$
   d) None of the mentioned ANS:-B
4. Which of the following are non regular?
   a) The set of strings in {a,b}* with an even number of b's
   b) The set of strings in {a, b, c}* where there is no c anywhere to the left of a
   c) The set of strings in {0, 1}* that encode, in binary, an integer w that is a multiple of 3. Interpret the empty strings e as the number 0.
   d) None of the mentioned, ANS:-d
5. If L is DFA-regular, L' is
   a) Non regular
   b) DFA-regular
   c) Non-finite
   d) None of the mentioned ANS:-B
6. Which of the following options is incorrect?
   a) A language L is regular if and only if ~L has finite number of equivalent classes.
   b) Let L be a regular language. If ~L has k equivalent classes, then any DFA that recognizes L must have atmost k states.
   c) A language L is NFA-regular if and only if it is DFA-regular.
   d) None of the mentioned ANS:- B
7. Myphill Nerode does the following:
   a) Minimization of DFA
   b) Tells us exactly when a language is regular
   c) Both (a) and (b)
   d) None of the mentioned ANS:-C
8. Which of the following are related to tree automaton?
   a) Myphill Nerode Theorem
   b) State machine

c) Courcelle’s Theorem
d) All of the mentioned ANS:-D

9. Given languages:
i) {$a^n b^n | n>=0$}
ii) ^{n} ^{n}
iii) {w∈{a,b}∗| #a(w)=#b(w)}, # represents occurrences
Which of the following is/are non regular?
a) i, iii
b) i
c) iii
d) i, ii, iii Ans;-D

10.. How many languages are over the alphabet R?
a) countably infinite
b) countably finite
c) uncountable finite
d) uncountable infinite ans D

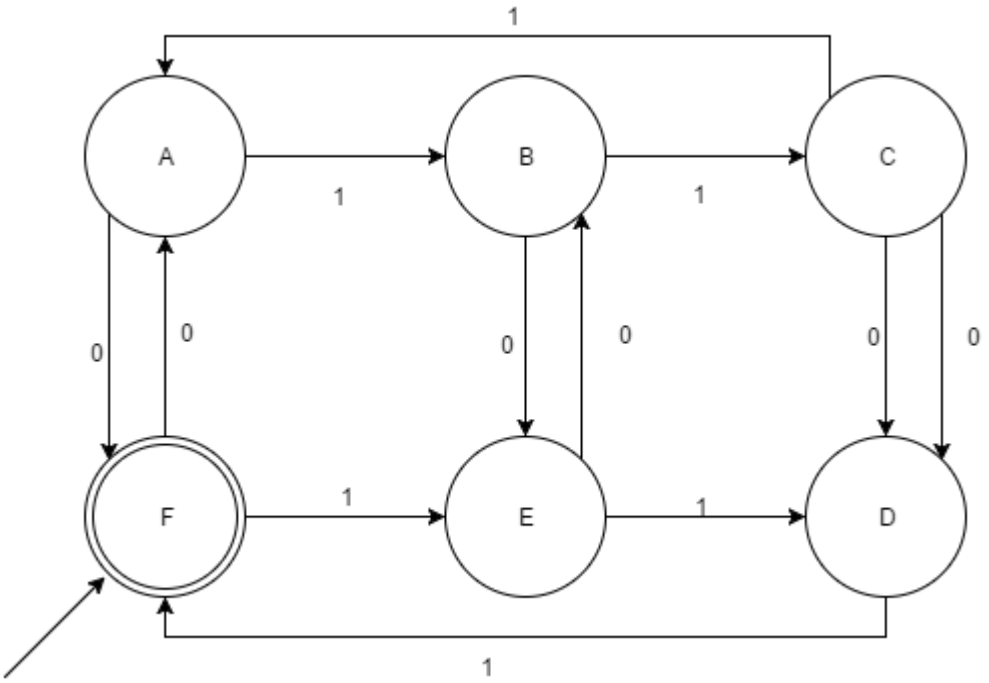
11. According to the 5-tuple representation i.e. FA= {Q, ∑, δ, q, F}
Statement 1: q ϵ Q’; Statement 2: FϵQ
a) Statement 1 is true, Statement 2 is false
b) Statement 1 is false, Statement 2 is true
c) Statement 1 is false, Statement 2 may be true
d) Statement 1 may be true, Statement 2 is false
View Answer :b

12. 3. 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
View Answer:a

13. 4. Which of the following option is correct?
A= {{abc, aaba}. {ε, a, bb}}
a) abcbb ₵ A
b) ε₵A
c) ε may not belong to A
d) abca ₵ A
View Answer:b
t

14. 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
View Answer :d

15. 6. 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 Ans:d

16. 7. Given:
    L1= {xϵ ∑*|x contains even no's of 0's}
    L2= {xϵ ∑*|x contains odd no's of 1's}
    No of final states in Language L1 U L2?
    a) 1
    b) 2
    c) 3
    d) 4
    View Answer:c
17. 8. 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
    View Answer:c
18. 9. The maximum sum of in degree and out degree over a state in a DFA can be determined as:
    ∑= {a, b, c, d}
    a) 4+4
    b) 4+16
    c) 4+0
    d) depends on the Language
    View Answer:d
19. 10. The sum of minimum and maximum number of final states for a DFA n states is equal to:

a) n+1
b) n
c) n-1
d) n+2
View Answer:a

20. 1. There are _____ tuples in finite state machine.
a) 4
b) 5
c) 6
d) unlimited
View Answer:b

21. 2. Transition function maps.
a) Σ * Q -> Σ
b) Q * Q -> Σ
c) Σ * Σ -> Q
d) Q * Σ -> Q
View Answer:d

22. 3. Number of states require to accept string ends with 10.
a) 3
b) 2
c) 1
d) can't be represented.
View Answer:a

23. 4. Extended transition function is .
a) Q * Σ* -> Q
b) Q * Σ -> Q
c) Q* * Σ* -> Σ
d) Q * Σ -> Σ
View Answer:a

24. 5. 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
View Answer:b

25. advertisement

26. 6. String X is accepted by finite automata if .
a) δ*(q,x) E A
b) δ(q,x) E A
c) δ*(Q0,x) E A
d) δ(Q0,x) E A
View Answer:c

27. 7. 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
View Answer:a

28. 8. Language of finite automata is.
    a) Type 0
    b) Type 1
    c) Type 2
    d) Type 3
    View Answer:d
29. 9. Finite automata requires minimum _____ number of stacks.
    a) 1
    b) 0
    c) 2
    d) None of the mentioned
    View Answer:b
30. 10. Number of final state require to accept Φ in minimal finite automata.
    a) 1
    b) 2
    c) 3
    d) None of the mentioned
    View Answer:d
31. 11. Regular expression for all strings starts with ab and ends with bba is.
    a) aba*b*bba
    b) ab(ab)*bba
    c) ab(a+b)*bba
    d) All of the mentioned
    View Answer:c
32. 12. How many DFA's exits with two states over input alphabet {0,1} ?
    a) 16
    b) 26
    c) 32
    d) 64
    View Answer:d
33. 13. 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
    View Answer:a
34. 14. 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
    View Answer:b
35. 15. FSM with output capability can be used to add two given integer in binary representation. This is
    a) True
    b) False
    c) May be true

d) None of the mentioned

View Answer:a

36. 1. A push down automaton employs _____ data structure.
    a) Queue
    b) Linked List
    c) Hash Table
    d) Stack

    View Answer:d
37. 2. State true or false:
    Statement: The operations of PDA never work on elements, other than the top.
    a) true
    b) false

    View Answer:a
38. 3. Which of the following allows stacked values to be sub-stacks rather than just finite symbols?
    a) Push Down Automaton
    b) Turing Machine
    c) Nested Stack Automaton
    d) None of the mentioned

    View Answer:c
39. 4. A non deterministic two way, nested stack automaton has n-tuple definition. State the value of n.
    a) 5
    b) 8
    c) 4
    d) 10

    View Answer:d
40. 5. Push down automata accepts _____ languages.
    a) Type 3
    b) Type 2
    c) Type 1
    d) Type 0

    View Answer:b
41. 6. The class of languages not accepted by non deterministic, nonerasing stack automata is _____
    a) NSPACE(n2)
    b) NL
    c) CSL
    d) All of the mentioned

    View Answer:d
42. 7. A push down automaton with only symbol allowed on the stack along with fixed symbol.
    a) Embedded PDA
    b) Nested Stack automata
    c) DPDA
    d) Counter Automaton

    View Answer:d

43. 8. Which of the operations are eligible in PDA?
    a) Push
    b) Delete
    c) Insert
    d) Pop
    View Answer:a,d
44. 9. A string is accepted by a PDA when
    a) Stack is empty
    b) Acceptance state
    c) Both (a) and (b)
    d) None of the mentioned
    View Answer:c
45. 10. The following move of a PDA is on the basis of:
    a) Present state
    b) Input Symbol
    c) Both (a) and (b)
    d) None of the mentioned
    View Answer:c

1. If two sets, R and T has no elements in common i.e. RÇT=Æ, then the sets are called
a) Complement
b) Union
c) Disjoint
d) Connected
View Answer
Answer: c
Explanation: Two sets are called disjoint if they have no elements in common i.e. RÇT=Æ.

2. Which among the following is not a part of the Context free grammar tuple?
a) End symbol
b) Start symbol
c) Variable
d) Production
View Answer
Answer: a
Explanation: The tuple definition of context free grammar is: (V, T, P, S) where V=set of variables, T=set of terminals, P=production, S= Starting Variable.

3. A context free grammar is a _____
a) English grammar
b) Regular grammar
c) Context sensitive grammar
d) None of the mentioned
View Answer
Answer: c
Explanation: Context free grammar is the set which belongs to the set of context free grammar. Similarly, Regular grammar is a set which belongs to the the set of Context free grammar.

4. The closure property of context free grammar includes :
a) Kleene
b) Concatenation
c) Union
d) All of the mentioned
View Answer
Answer: d
Explanation: Context free grammars are closed under kleene operation, union and concatenation too.

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5. Which of the following automata takes stack as auxiliary storage?
a) Finite automata
b) Push down automata
c) Turing machine
d) All of the mentioned
View Answer
Answer: b
Explanation: Pushdown Automaton uses stack as an auxiliary storage for its operations. Turing machines use Queue for the same.

6. Which of the following automata takes queue as an auxiliary storage?
a) Finite automata
b) Push down automata
c) Turing machine
d) All of the mentioned
View Answer
Answer: c
Explanation: Pushdown Automaton uses stack as an auxiliary storage for its operations. Turing machines use Queue for the same.

7. A context free grammar can be recognized by
a) Push down automata
b) 2 way linearly bounded automata
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: A linearly bounded automata is a restricted non deterministic turing machine which is capable of accepting ant context free grammar.

8. A null production can be referred to as:
a) String
b) Symbol
c) Word
d) All of the mentioned
View Answer
Answer: a
Explanation: Null production is always taken as a string in computational theory.

9. The context free grammar which generates a Regular Language is termed as:
a) Context Regular Grammar
b) Regular Grammar
c) Context Sensitive Grammar
d) None of the mentioned
View Answer
Answer: b
Explanation: Regular grammar is a subset of Context free grammar. The CFGs which produces a language for which a finite automaton can be created is called Regular grammar.

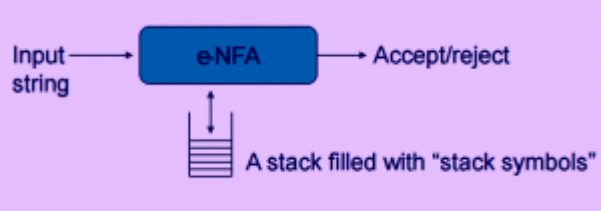
10. NPDA stands for
a) Non-Deterministic Push Down Automata
b) Null-Push Down Automata
c) Nested Push Down Automata
d) All of the mentioned
View Answer
Answer: a
Explanation: NPDA stands for non-deterministic push down automata whereas DPDA stands for deterministic push down automata.

1. The production of the form A->B , where A and B are non terminals is called
a) Null production
b) Unit production
c) Greibach Normal Form
d) Chomsky Normal Form
View Answer
Answer: b
Explanation: A->ε is termed as Null production while A->B is termed as Unit production.

2. Halting states are of two types. They are:
a) Accept and Reject
b) Reject and Allow
c) Start and Reject
d) None of the mentioned
View Answer
Answer: a
Explanation: Halting states are the new tuple members introduced in turing machine and is of two types: Accept Halting State and Reject Halting State.

3. A push down automata can be represented as:
PDA= ε-NFA +[stack] State true or false:
a) true
b) false
View Answer

Answer: a
Explanation:



4. A pushdown automata can be defined as: (Q, ∑, G, q0, z0, A, d)
What does the symbol z0 represents?
a) an element of G
b) initial stack symbol
c) top stack alphabet
d) all of the mentioned
View Answer
Answer: d
Explanation: z0 is the initial stack symbol, is an element of G. Other symbols like d represents the transition function of the machine.

5. Which of the following correctly recognize the symbol '|-' in context to PDA?
a) Moves
b) transition function
c) or/not symbol
d) none of the mentioned
View Answer
Answer: a
Explanation: Using this notation, we can define moves and further acceptance of a string by the machine.

6. Which among the following is true for the given statement?
Statement :If there are strings R and T in a language L so that R is prefix of T and R is not equivalent to T.
a) No DPDA can accept L by empty stack
b) DPDA can accept L by an empty stack
c) L is regular
d) None of the mentioned
View Answer
Answer: a
Explanation: If M is a DPDA accepting L by an empty stsck, R and T are distinct strings in L, and R is a prefix of T, then the sequence of moves M must make in order to accept R leaves the stack empty, since R∈L. But then T cannot be accepted, since M cant move with an empty stack.

7. Which of the following can be accepted by a DPDA?
a) The set of even length palindrome over {a,b}
b) The set of odd length palindrome over {a,b}
c) {xx^c| where c stands for the complement,{0,1}}

d) None of the mentioned
View Answer
Answer: d
Explanation: Theorem: The language pal of palindromes over the alphabet {0,1} cannot be accepted by any finite automaton , and it is therefore not regular.

8. For a counter automaton, with the symbols A and Z0, the string on the stack is always in the form of _____
a) A
b) A^nZ0, n>=0
c) $Z0A^n$, n>=0
d) None of the mentioned
View Answer
Answer: b
Explanation:The possible change in the stack contents is a change in the number of A's on the stack.

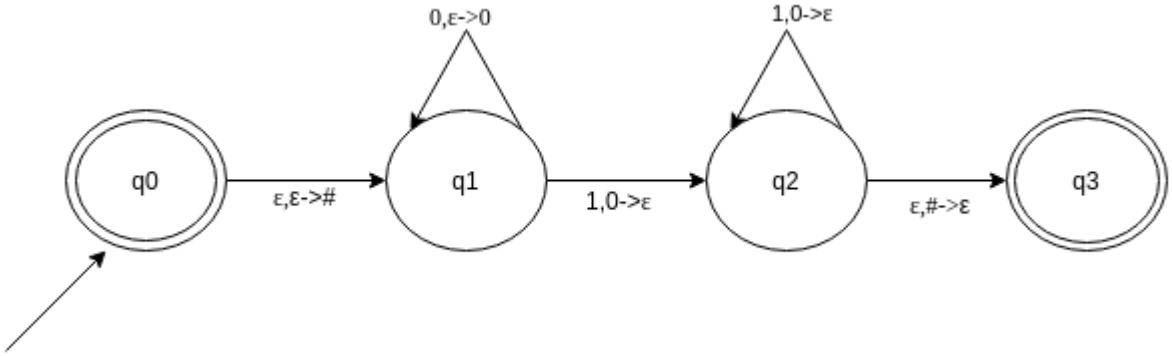
9. State true or false:
Statement: Counter Automaton can exist for the language $L=\{0^i1^i|i>=0\}$
a) true
b) false
View Answer
Answer: a
Explanation: The PDA works as follows. Instead of saving excess 0's or 1's on the stack, we save *'s and use two different states to indicate which symbol there is currently a surplus of. The state q0 is the initial state and the only accepting state.

10. Let ∑={0,1}* and the grammar G be:
S->ε
S->SS
S->0S1|1S0
State which of the following is true for the given
a) Language of all and only Balanced strings
b) It contains equal number of 0's and 1's
c) Ambiguous Grammar
d) All of the mentioned
View Answer
Answer: d

1. The instantaneous PDA is has the following elements
a) State
b) Unconsumed input
c) Stack content
d) All of the mentioned
View Answer
Answer: d
Explanation: The instantaneous description of a PDA is represented by 3 tuple: (q,w,s)
where q is the state, w is the unconsumed input and s is the stack content.

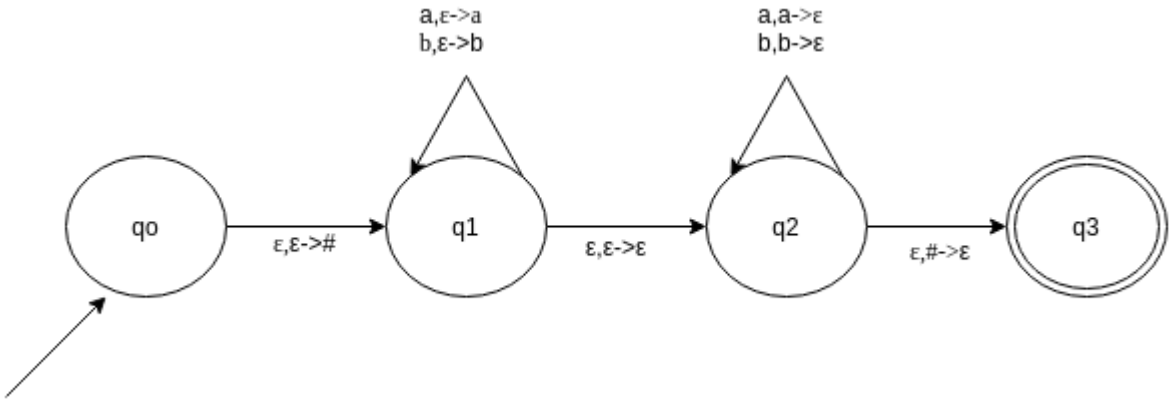
2. The moves in the PDA is technically termed as:
a) Turnstile
b) Shifter
c) Router
d) None of the mentioned
View Answer
Answer: a
Explanation: A turnstile notation is used for connecting pairs od ID's taht represents one or many moves of a PDA.

3. Which of the following option resembles the given PDA?



a) $\{0^n1^n|n>=0\}$
b) $\{0^n1^{2n}|n>=0\}$
c) $\{0^{2n}1^n|n>=0\}$
d) None of the mentioned
View Answer
Answer: a

4. Which of the following correctly resembles the given state diagram?



a) $\{ww^r|w=(a+b)^*\}$
b) ε is called the initial stack symbol
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: a
Explanation: Initially we put a special symbol '#' into the empty stack. At state q1, the w is being read. In state q2, each 0 or 1 is popped when it matches the input. If any

other input is given, the PDA will go to a dead state. When we reach that special symbol '#', we go to the accepting state q3.

5. Which of the following assertion is false?
a) If L is a language accepted by PDA1 by final state, there exist a PDA2 that accepts L by empty stack i.e. L=L(PDA1)=L(PDA2)
b) If L is a CFL then there exists a push down automata P accepting CF; ; by empty stack i.e. L=M(P)
c) Let L is a language accepted by PDA1 then there exist a CFG X such that L(X)=M(P)
d) All of the mentioned
View Answer
Answer: d
Explanation:
All the assertions mentioned are theorems or corollary.

6. A push down automata can represented using:
a) Transition graph
b) Transition table
c) ID
d) All of the mentioned
View Answer
Answer: d
Explanation: Yes, a PDA can be represented using a transition diagram, transition table and an instantaneous description.

7. State true or false:
Statement: Every context free grammar can be transformed into an equvalent non deterministic push down automata.
a) true
b) false
View Answer
Answer: a
Explanation: Push down automata is the automaton machine for all the context free grammar or Type 2 languages.

8. Which of the following statement is false?
a) For non deterministic PDA, equivalence is undecidable
b) For deterministic PDA, equivalence is decidable
c) For deterministic PDA, equivalence is undecidable.
d) None of the mentioned
View Answer
Answer: c
Explanation: Geraud proved the equivalence problem decidable for Deterministic PDA .

9. Which of the following are the actions that operates on stack top?
a) Pushing
b) Popping

c) Replacing
d) All of the mentioned
View Answer
Answer: d
Explanation: Push, pop and replace are all the basic and only operations that takes place on stack top.

10. A push down automata is said to be _____ if it has atmost one transition around all configurations.
a) Finite
b) Non regular
c) Non-deterministic
d) Deterministic
View Answer
Answer: d
Explanation: DPDA or Deterministic Push down automata has atmost one transition applicable to each configuration.

1. The transition a Push down automaton makes is additionally dependent upon the:
a) stack
b) input tape
c) terminals
d) none of the mentioned
View Answer
Answer: a
Explanation: A PDA is a finite machine which has an additional stack storage. Its transitions are based not only on input and the correct state but also on the stack.

2. A PDA machine configuration (p, w, y) can be correctly represented as:
a) (current state, unprocessed input, stack content)
b) (unprocessed input, stack content, current state)
c) (current state, stack content, unprocessed input)
d) none of the mentioned
View Answer
Answer: a
Explanation: A machine configuration is an element of K×Σ*×Γ*.
(p,w,γ) = (current state, unprocessed input, stack content).

3. |-* is the _____ closure of |-
a) symmetric and reflexive
b) transitive and reflexive
c) symmetric and transitive
d) none of the mentioned
View Answer
Answer: b
Explanation: A string w is accepted by a PDA if and only if (s,w, e) |-* (f, e, e)

4. With reference of a DPDA, which among the following do we perform from the start state with an empty stack?
a) process the whole string
b) end in final state

c) end with an empty stack
d) all of the mentioned
View Answer
Answer: d
Explanation: The empty stack in the end is our requirement relative to finite state automatons.

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5. A DPDA is a PDA in which:
a) No state p has two outgoing transitions
b) More than one state can have two or more outgoing transitions
c) Atleast one state has more than one transitions
d) None of the mentioned
View Answer
Answer: a
Explanation: A Deterministic Push Down Automata is a Push Down Automata in which no state p has two or more transitions.

6. State true or false:
Statement: For every CFL, G, there exists a PDA M such that L(G) = L(M) and vice versa.
a) true
b) false
View Answer
Answer: a
Explanation: There exists two lemma's such that:
a) Given a grammar G, construct the PDA and show the equivalence
b) Given a PDA, construct a grammar and show the equivalence

7. If the PDA does not stop on an accepting state and the stack is not empty, the string is:
a) rejected
b) goes into loop forever
c) both (a) and (b)
d) none of the mentioned
View Answer
Answer: a
Explanation: To accept a string, PDA needs to halt at an accepting state and with a stack empty, else it is called rejected. Given a PDA M, we can construct a PDA M' that accepts the same language as M, by both acceptance criteria.

8. A language accepted by Deterministic Push down automata is closed under which of the following?
a) Complement
b) Union
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: a
Explanation: Deterministic Context free languages(one accepted by PDA by final

state), are drastically different from the context free languages. For example they are closed under complementation and not union.

9. Which of the following is a simulator for non deterministic automata?
a) JFLAP
b) Gedit
c) FAUTO
d) None of the mentioned
View Answer
Answer: a
Explanation: JFLAP is a software for experimenting with formal topics including NFA, NPDA, multi-tape turing machines and L-systems.

10. Finite-state acceptors for the nested words can be:
a) nested word automata
b) push down automata
c) ndfa
d) none of the mentioned
View Answer
Answer: a
Explanation: The linear encodings of languages accepted by finite nested word automata gives the class of ‘visibly pushdown automata’

1. Which of the following is analogous to the following?
:NFA and NPDA
a) Regular language and Context Free language
b) Regular language and Context Sensitive language
c) Context free language and Context Sensitive language
d) None of the mentioned
View Answer
Answer: a
Explanation: All regular languages can be accepted by a non deterministic finite automata and all context free languages can be accepted by a non deterministic push down automata.

2. Let T={p, q, r, s, t}. The number of strings in S* of length 4 such that no symbols can be repeated.
a) 120
b) 625
c) 360
d) 36
View Answer
Answer: b
Explanation: Using the permutation rule, we can calculate that there will be total of 625 permutations on 5 elements taking 4 as the length.

3. 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
View Answer
Answer: a
Explanation: The chomsky hierarchy lays down the following order:
Regular<CFL<CSL<Unrestricted

4. 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
View Answer
Answer: c
Explanation: All the regular languages are the subset to context free languages and thus can be accepted using push down automata.

5. Which of the following is an incorrect regular expression identity?
a) R+f=R
b) eR=e
c) Rf=f
d) None of the mentioned
View Answer
Answer: b
Explanation: e is the identity for concatenation. Thus, eR=R.

6. Which of the following strings do not belong the given regular expression?
(a)*(a+cba)
a) aa
b) aaa
c) acba
d) acbacba
View Answer
Answer: d
Explanation: The string acbacba is unacceptable by the regular expression (a)*(a+cba).

7. Which of the following regular expression allows strings on {a,b}* with length n where n is a multiple of 4.
a) (a+b+ab+ba+aa+bb+aba+bab+abab+baba)*
b) (bbbb+aaaa)*
c) ((a+b)(a+b)(a+b)(a+b))*
d) None of the mentioned
View Answer
Answer: c
Explanation: Other mentioned options do not many of the combinations while option c seems most reliable.

8. Which of the following strings is not generated by the given grammar:
S->SaSbS|e

a) aabb
b) abab
c) abaabb
d) None of the mentioned
View Answer
Answer: d
Explanation: All the given options are generated by the given grammar. Using the methods of left and right derivations, it is simpler to look for string which a grammar can generate.

9. abb*c denotes which of the following?
a) {abnc|n=0}
b) {abnc|n=1}
c) {anbc|n=0}
d) {abcn|n>0}
View Answer
Answer: b
Explanation: Here, the first mentioned b is fixed while the other can be zero or can be repeated any number of time.

10. The following denotion belongs to which type of language:
G=(V, T, P, S)
a) Regular grammar
b) Context free grammar
c) Context Sensitive grammar
d) All of the mentioned
View Answer
Answer: b
Explanation: Ant formal grammar is represented using a 4-tuple definition where V= finite set of variables, T= set of terminal characters, P=set of productions and S= Starting Variable with certain conditions based on the type of formal grammar.

1. Context free grammar is called Type 2 grammar because of _____ hierarchy.
a) Greibach
b) Backus
c) Chomsky
d) None of the mentioned
View Answer
Answer: c
Explanation: Chomsky hierarchy decide four type of language :Type 3- Regular Language, Type 2-Context free language, Type 1-Context Sensitive Language, Type 0- Unrestricted or Recursively Ennumerable language.

2. a→b
Restriction: Length of b must be atleast as much length of a.
Which of the following is correct for the given assertion?
a) Greibach Normal form
b) Context Sensitive Language
c) Chomsky Normal form

d) Recursively Ennumerable language
View Answer
Answer: b
Explanation: A context-sensitive grammar (CSG) is a formal grammar in which the left-hand sides and right-hand sides of any production rules may be surrounded by a context of terminal and non terminal symbols. Context-sensitive grammars are more general than context-free grammars, in the sense that there are some languages that cannot be described by context-free grammars, but can be described by CSG.

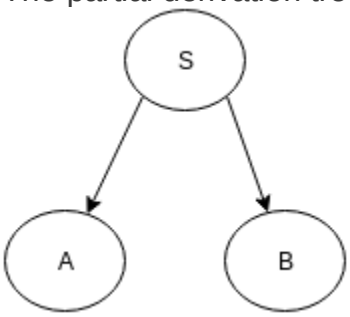
3. From the definition of context free grammars,
G=(V, T, P, S)
What is the solution of VÇT?
a) Null
b) Not Null
c) Cannot be determined, depends on the language
d) None of the mentioned
View Answer
Answer: a
Explanation: V is the set of non terminal symbols while T is the st of terminal symbols, their intersection would always be null.

4. If P is the production, for the given statement, state true or false.
P: V->(V∑T)* represents that the left hand side production rule has no right or left context.
a) true
b) false
View Answer
Answer: a
Explanation: Here the production P is from the definition of Context free grammar and thus, has no right or left context.

5. There exists a Context free grammar such that:
X->aX
Which among the following is correct with respect to the given assertion?
a) Left Recursive Grammar
b) Right Recursive Grammar
c) Non Recursive Grammar
d) None of the mentioned
View Answer
Answer: b
Explanation: The grammar with right recursive production is known as Right recursive grammar. Right recursive production is of the form X->aX where a is a terminal and X is a non terminal.

6. If the partial derivation tree contains the root as the starting variable, the form is known as:
a) Chomsky hierarchy
b) Sentential form
c) Root form

d) None of the mentioned
View Answer
Answer: b
Explanation: Example: For any grammar, productions be:
S->AB
A->aaA| ^
B->Bb| ^
The partial derivation tree can be drawn as:



Since it has the root as S, this can be said to be in sentential form.

7. Find a regular expression for a grammar which generates a language which states :
L contains a set of strings starting wth an a and ending with a b, with something in the middle.
a) a(a*Ub*)b
b) a*(aUb)b*
c) a(a*b*)b
d) None of the mentioned
View Answer
Answer: a
Explanation: The grammar for the same language can be stated as :
(1) S → aMb
(2) M → A
(3) M → B
(4) A → e
(5) A → aA
(6) B → e
(7) B → bB

8. Which of the following is the correct representation of grammar for the given regular expression?
a(aUb)*b

a) (1) S → aMb
(2) M → e
(3) M → aM
(4) M → bM

b) (1) S → aMb
(2) M → Mab

(3) M → aM
(4) M → bM

c) (1) S → aMb
(2) M → e
(3) M → aMb
(4) M → bMa

d) None of the mentioned
View Answer
Answer: a
Explanation:
The basic idea of grammar formalisms is to capture the structure of string by
a) using special symbols to stand for substrings of a particular structure
b) using rules to specify how the substrings are combined to form new substrings.

9. A CFG consist of the following elements:
a) a set of terminal symbols
b) a set of non terminal symbols
c) a set of productions
d) all of the mentioned
View Answer
Answer: d
Explanation: A CFG consists of:
a) a set of terminals, which are characters of alphabets that appear in the string generated by the grammar.
b) a set of non terminals, which are placeholders for patterns of terminal symbols that can be generated by the nonterminal symbols.
c) a set of productions, which are set of rules to transit from one state to other forming up the string
d) a start symbol, a special non terminal symbol that appears in the initial string generated in the grammar.

10. A CFG for a program describing strings of letters with the word “main” somewhere in the string:
a) -> m a i n
-> | epsilon
-> A | B | … | Z | a | b … | z

b) –> m a i n
–>
–> A | B | … | Z | a | b … | z

c) –> m a i n
–> | epsilon
–> A | B | … | Z | a | b … | z

d) None of the mentioned
View Answer

Answer: a
Explanation: None.

1. CFGs are more powerful than:
a) DFA
b) NDFA
c) Mealy Machine
d) All of the mentioned
View Answer
Answer: d
Explanation:
Context-free grammars are strictly more powerful than regular expressions:
1) Any language that can be generated using regular expressions can be generated by a context-free grammar.
2) There are languages that can be generated by a context-free grammar that cannot be generated by any regular expression.
As a corollary, CFGs are strictly more powerful than DFAs and NDFAs.

2. State true or false:
S-> 0S1|01
Statement: No regular expression exists for the given grammar.
a) true
b) false
View Answer
Answer: a
Explanation: The grammar generates a language L such that L={0^n1^n|n>=1} which is not regular. Thus, no regular expression exists for the same.

3. For the given set of code, the grammar representing real numbers in Pascal has error in one of the six lines. Fetch the error.
(1) ->
(2) -> | epsilon
(3) -> | epsilon
(4) -> ‘E’ | epsilon
(5) -> + | – | epsilon
(6) -> 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
a) 3
b) 4
c) 2
d) No errors
View Answer
Answer: a
Explanation:
–>
–> | epsilon
–> ‘.’ | epsilon
–> ‘E’ | epsilon
–> + | – | epsilon
–> 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

4. Which among the following is incorrect with reference to a derivation tree?
a) Every vertex has a label which is a terminal or a variable.
b) The root has a label which can be a terminal.
c) The label of the internal vertex is a variable.
d) None of the mentioned
View Answer
Answer: b
Explanation: The root or interms of the grammar, starting variable can not be a terminal.

5. Let G=(V, T, P, S)
where a production can be written as:
S->aAS|a
A->SbA|ba|SS
Which of the following string is produced by the grammar?
a) aabbaab
b) aabbaa
c) baabab
d) None of the mentioned
View Answer
Answer: b
Explanation: The step wise grammar translation can be written as:
aAS->aSbaA->aabAS->aabbaa

6. Statement 1: Ambiguity is the property of grammar but not the language.
Statement 2: Same language can have more than one grammar.
Which of the following options are correct with respect to the given statements?
a) Statement 1 is true but statement 2 is false
b) Statement 1 is false but statement 2 is true
c) Both the statements are true
d) Both the statements are false
View Answer
Answer: c
Explanation: One language can more than one grammar. Some can be ambiguous and some cannot.

7. Which of the following are non essential while simplifying a grammar?
a) Removal of useless symbols
b) Removal of unit productions
c) Removal of null production
d) None of the mentioned
View Answer
Answer: d
Explanation: Here are some process used to simplify a CFG but to produce an equivalent grammar:
a) Removal of useless symbols(non terminal) b) Removal of Unit productions and c) Removal of Null productions.

8. Which of the following are context free language?
a) $L=\{a^ib^i|i>=0\}$
b) $L=\{ww^r|$ w is a string and r represents reverse$\}$
c) Both (a) and (b)
d) one of the mentioned
View Answer
Answer: a
Explanation: None.

9. The language $L =\{a^i2b^i|i>=0\}$ is:
a) recursive
b) deterministic CFL
c) regular
d) Two of the mentioned is correct
View Answer
Answer: d
Explanation: The language is recursive and every recursive language is a CFL.

10. L->rLt|tLr|t|r
The given grammar produces a language which is:
a) All palindrome
b) All even palindromes
c) All odd palindromes
d) Strings with same begin and end symbols
View Answer
Answer: c
Explanation: As there exists no production for the palindrome set, even palindromes like abba, aabbaa, baaaaaab, etc will not be generated.

1. A turing machine is a
a) real machine
b) abstract machine
c) hypothetical machine
d) more than one option is correct
View Answer
Answer: d
Explanation: A turing machine is abstract or hypothetical machine thought by mathematician Alan Turing in 1936 capable of simulating any algorithm, however complicated it is.

2. A turing machine operates over:
a) finite memory tape
b) infinite memory tape
c) depends on the algorithm
d) none of the mentioned
View Answer
Answer: b
Explanation: The turing machine operates on an infinite memory tape divided into cells. The machine positions its head over the cell and reads the symbol.

3. Which of the functions are not performed by the turing machine after reading a symbol?
a) writes the symbol
b) moves the tape one cell left/right
c) proceeds with next instruction or halts
d) none of the mentioned
View Answer
Answer: d
Explanation: After the read head reads the symbol from the input tape, it performs the following functions:
a) writes a symbol(some model allow symbol erasure/no writing)
b) moves the tape left or right (some models allows no motion)
c) proceeds with subsequent instruction or goes either into accepting halting state or rejecting halting state.

4. ‘a’ in a-machine is :
a) Alan
b) arbitrary
c) automatic
d) None of the mentioned
View Answer
Answer: c
Explanation: The turing machine was invented by Alan turing in 1936. He named it as a-machine(automatic machine).

5. Which of the problems were not answered when the turing machine was invented?
a) Does a machine exists that can determine whether any arbitrary machine on its tape is circular.
b) Does a machine exists that can determine whether any arbitrary machine on its tape is ever prints a symbol
c) Hilbert Entscheidungs problem
d) None of the mentioned
View Answer
Answer: d
Explanation: Invention of turing machine answered a lot of questions which included problems like decision problem, etc.) . Alan was able to prove the properties of computation using such model.

6. The ability for a system of instructions to simulate a Turing Machine is called _____
a) Turing Completeness
b) Simulation
c) Turing Halting
d) None of the mentioned
View Answer
Answer: a
Explanation: Turing Completeness the ability for a system of instructions to simulate a Turing machine. A programming language that is Turing complete is theoretically

capable of expressing all tasks accomplishable by computers; nearly all programming languages are Turing complete.

7. Turing machine can be represented using the following tools:
a) Transition graph
b) Transition table
c) Queue and Input tape
d) All of the mentioned
View Answer
Answer: d
Explanation: We can represent a turing machine, graphically, tabularly and diagramatically.

8. Which of the following is false for an abstract machine?
a) Turing machine
b) theoretical model of computer
c) assumes a discrete time paradigm
d) all of the mentioned
View Answer
Answer: d
Explanation: A n abstract machine also known as abstract computer, is a theoretical model of computer or hardware system in automata theory. Abstraction in computing process usually assumes a discrete time paradigm.

9. Fill in the blank with the most appropriate option.
Statement: In theory of computation, abstract machines are often used in _____ regarding computability or to analyze the complexity of an algorithm.
a) thought experiments
b) principle
c) hypothesis
d) all of the mentioned
View Answer
Answer: d
Explanation: A thought experiment considers some hypothesis, theory or principle for the purpose of thinking through its consequences.

10. State true or false:
Statement: RAM model allows random access to indexed memory locations.
a) true
b) false
View Answer
Answer: a
Explanation: In computer science, Random access machine is an abstract machine in the general class of register machines. Random access machine should not be confused with Random access memory.

1. A turing machine that is able to simulate other turing machines:
a) Nested Turing machines
b) Universal Turing machine
c) Counter machine

d) None of the mentioned
View Answer
Answer: b
Explanation: A more mathematically oriented definition with the same universal nature was introduced by church and turing together called the Church-Turing thesis(formal theory of computation).

2. Which of the problems are unsolvable?
a) Halting problem
b) Boolean Satisfiability problem
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: Alan turing proved in 1936 that a general algorithm to solve the halting problem for all possible program-input pairs cannot exist.

3. Which of the following a turing machine does not consist of?
a) input tape
b) head
c) state register
d) none of the mentioned
View Answer
Answer: d
Explanation: A state register is one which stores the state of the turing machine, one of the finitely many. Among these is the special start state with which the state register is initialized.

4. The value of n if turing machine is defined using n-tuples:
a) 6
b) 7
c) 8
d) 5
View Answer
Answer: b
Explanation:
The 7-tuple definition of turing machine: (Q, S, G, d, q0, B, F)
where Q= The finite set of states of finite control
S= The finite set of input symbols
G= The complete set of tape symbols
d= The transition function
q0= The start state, a member of Q, in which the finite control is found initially.
B= The blank symbol
F= The set of final or accepting states, a subset of Q.

5. If d is not defined on the current state and the current tape symbol, then the machine _____
a) does not halts
b) halts
c) goes into loop forever

d) none of the mentioned
View Answer
Answer: b
Explanation: If we reach h_A or h_R, we say TM halts. Once it has halted, it cannot move further, since d is not defined at any pair (h_A,X) or (h_R,X) where h_A = accept halting state and h_R = reject halting state.

6. Statement: Instantaneous descriptions can be designed for a Turing machine. State true or false:
a) true
b) false
View Answer
Answer: a
Explanation: Inorder to describe formally what a Turing machine does, we need to develop a notation for configurations or Instantaneous descriptions(ID).

7. Which of the following are the models equivalent to Turing machine?
a) Multi tape turing machine
b) Multi track turing machine
c) Register machine
d) All of the mentioned
View Answer
Answer: d
Explanation: Many machines that might be thought to have more computational capability than a simple UTM can be shown to have no more power. They might compute faster or use less memory but cannot compute more powerfully i.e. more mathematical questions.

8. Which among the following is incorrect for o-machines?
a) Oracle Turing machines
b) Can be used to study decision problems
c) Visualizes Turing machine with a black box which is able to decide cerain decion problems in one operation
d) None of the mentioned
View Answer
Answer: d
Explanation: In automata theory, an o- machine or oracle machine is a abstract machine used to study decision problems. The problem the oracle solves can be of any complexity class. Even undecidable problems like halting problems can be used.

9. RASP stands for:
a) Random access storage program
b) Random access stored program
c) Randomly accessed stored program
d) Random access storage programming
View Answer
Answer: b
Explanation: RASP or Random access stored program is an abstract machine that has instances like modern stored computers.

10. Which of the following is not true about RASP?
a) Binary search can be performed more quickly using RASP than a turing machine
b) Stores its program in memory external to its state machines instructions
c) Has infinite number of distinguishable, unbounded registers
d) Binary search can be performed less quickly using RASP than a turing machine
e) More than two options are incorrect
View Answer
Answer: d
Explanation: In theoretical computer science, the random access stored program(RASP) machine model is an abstract machine used for the purpose of algorithm development and algorithm complexity theory.

11. State true or false:
Statement: RASP is to RAM like UTM is to turing machine.
a) true
b) false
View Answer
Answer: a
Explanation: The Rasp is a random access machine model that, unlike the RAM has its program in its registers together with its input. The registers are unbounded(infinite in capacity); whether the number of registers is finite is model-specific.

1. The class of recursively ennumerable language is known as:
a) Turing Class
b) Recursive Languages
c) Universal Languages
d) RE
View Answer
Answer: d
Explanation: RE or recursively ennumerable is only called the class of recursively ennumerable language.

2. A language L is said to be Turing decidable if:
a) recursive
b) TM recognizes L
c) TM accepts L
d) None of the mentioned
View Answer
Answer: a,b
Explanation: A language L is recursively ennumerable if there is a turing machine that accepts L, and recursive if there is a TM that recognizes L.(Sometimes these languages are alse called Turing-acceptable and Turing-decidable respectively).

3. Which of the following statements are false?
a) Every recursive language is recursively ennumerable
b) Recursively ennumerable language may not be recursive
c) Recursive languages may not be recursively ennumerable
d) None of the mentioned
View Answer

Answer: c
Explanation: Every recursive language is recursively ennumerable but there exists recursively ennumerable languages that are not recursive. If L is accepted by a Non deterministic TM T, and every possible sequence of moves of T causes it to halt, then L is recursive.

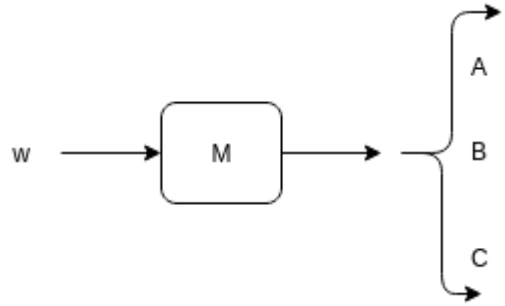
4. Choose the correct option:
Statement: If L1 and L2 are recursively ennumerable languages over S, then the following is/are recursively ennumerable.
a) L1 U L2
b) L2 ∩ L2
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: Both the union and intersection operations preserve the property of recursive ennumerablity(Theorem).

5. If L is a recursive language, L' is:
a) Recursive
b) Recursively Ennumerable
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: If T is a turing machine recognizing L, we can make it recognize L' by interchanging the two outputs. And every recursive language is recursively ennumerable.

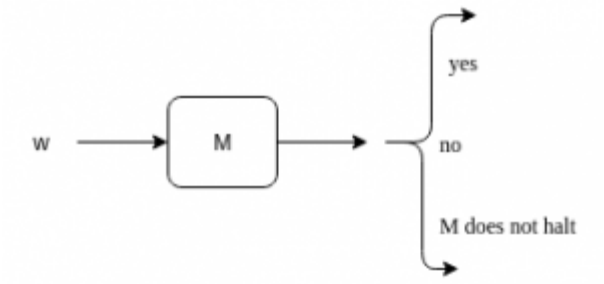
6. Choose the appropriate option:
Statement: If a language L is recursive, it is closed under the following operations:
a) Union
b) Intersection
c) Complement
d) All of the mentioned
View Answer
Answer: d
Explanation: The closure property of recursive languages include union, intersection and complement operations.

7. A recursively ennumerable language L can be recursive if:
a) L' is recursively ennumerable
b) Every possible sequence of moves of T, the TM which accept L, causes it to halt
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: Theorem- If L is a recursively ennumerable language whose complement is recursively ennumerable, then L is recursive.

8. A language L is recursively ennumerable if L=L(M) for some turing machine M.



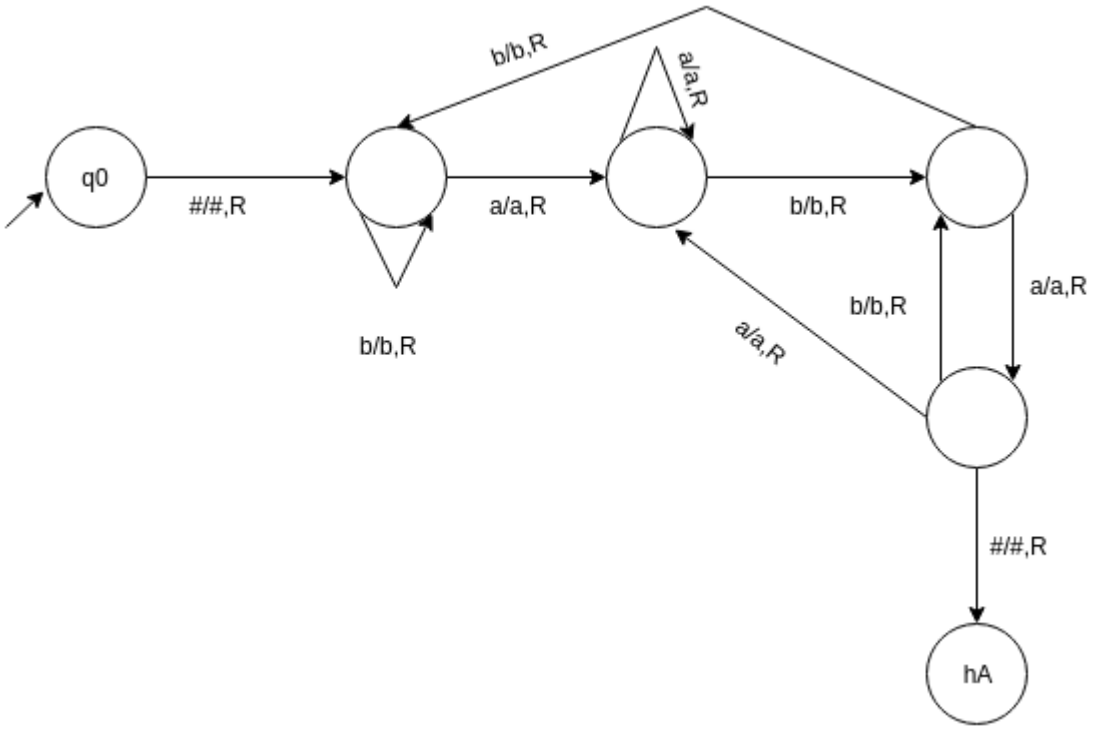
Which among the following cannot be among A, B and C?
a) yes w ∈ L
b) no w ∉ L
c) M does not halt w ∉ L
d) None of the mentioned
View Answer
Answer: d
Explanation:



9. State true or false:
Statement: An ennumerator is a turing machine mwith extra output tape T, where symbols, once written, are never changed.
a) true
b) false
View Answer
Answer: a
Explanation: To ennumerate a set means to list the elements once at a time, and to say that a set is ennumerable should perhaps mean that there exists an algorithm for ennumerating it.

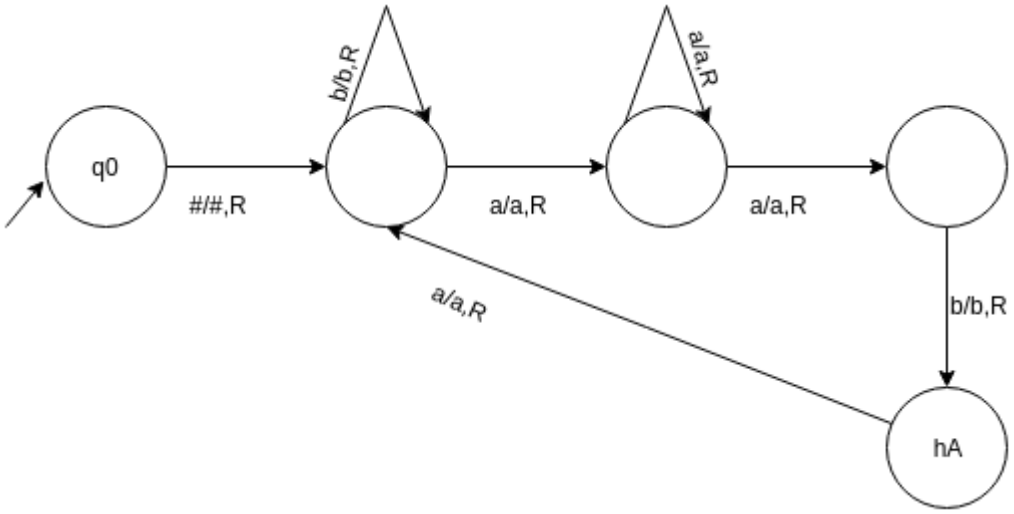
10. A Language L may not be accepted by a Turing Machine if:
a) It it is recursively ennumerable
b) It is recursive
c) L can be ennumerated by some turing machine
d) None of the mentioned
View Answer
Answer: b
Explanation: A language L is recursively ennumerable if and only if it can be ennumerated by some turing machine. A recursive ennumerable language may or may not be recursive.

1. Which of the following regular expression resembles the given diagram?

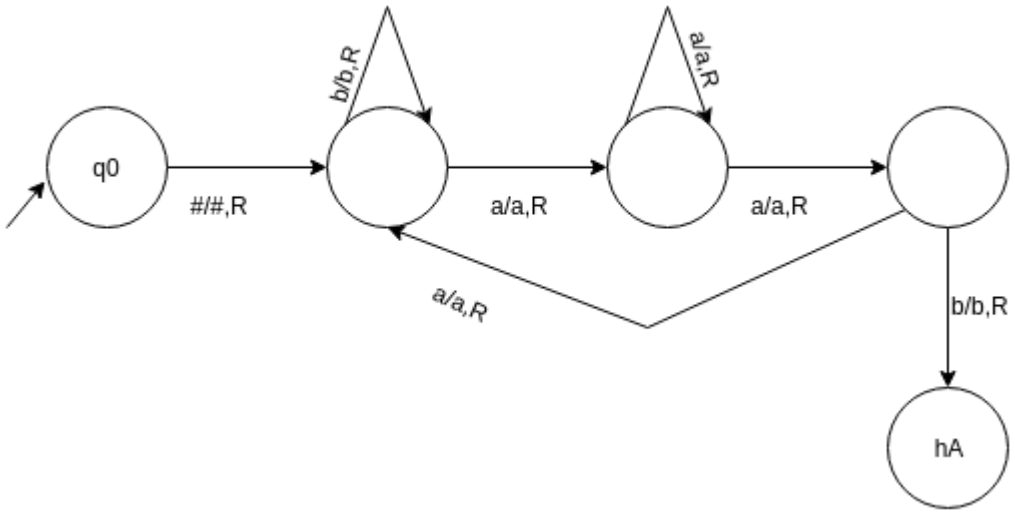


a) {a}*{b}*{a,b}
b) {a,b}*{aba}
c) {a,b}*{bab}
d) {a,b}*{a}*{b}*
View Answer
Answer: b
Explanation: The given diagram is a transition graph for a turing machine which accepts the language with the regular expression {a,b}*{aba}.

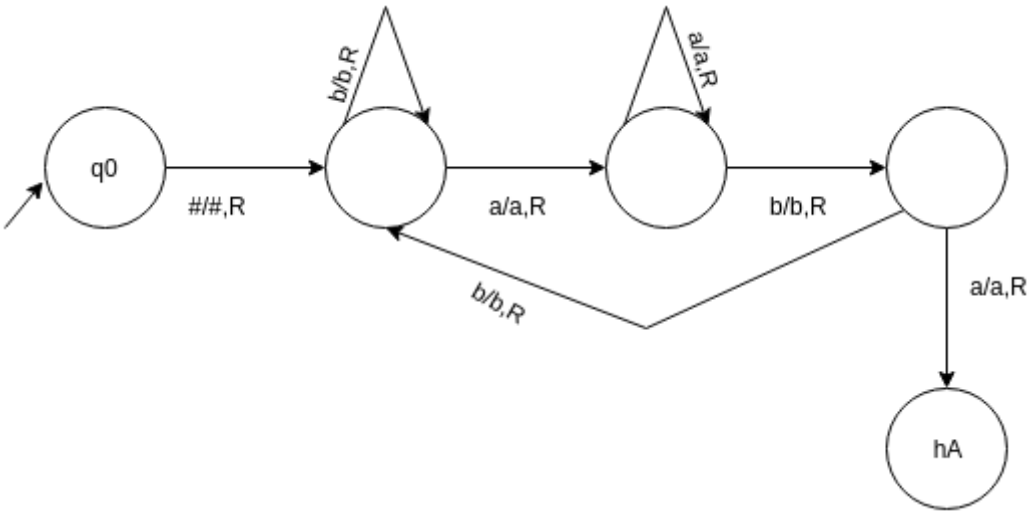
2. Construct a turing machine which accepts a string with ‘aba’ as its substring.



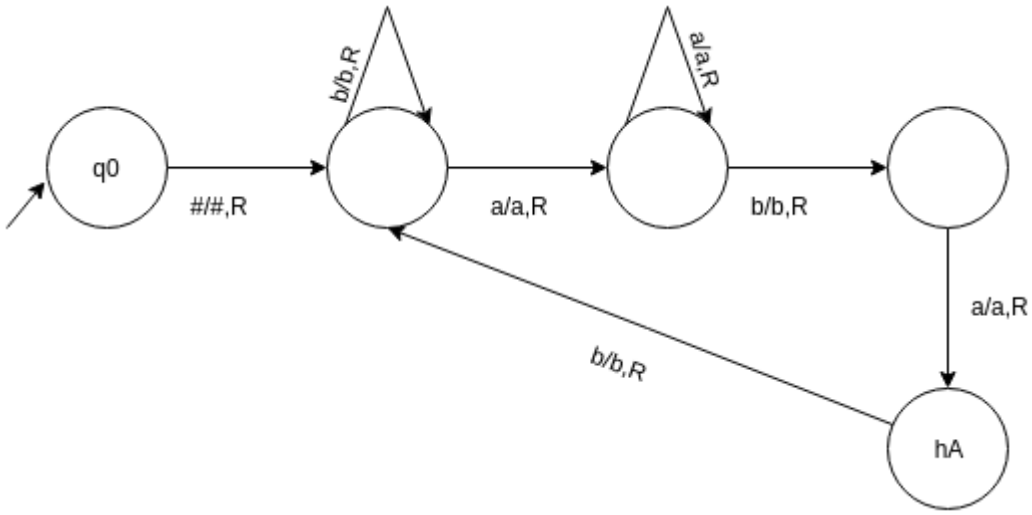
a)



b)



c)



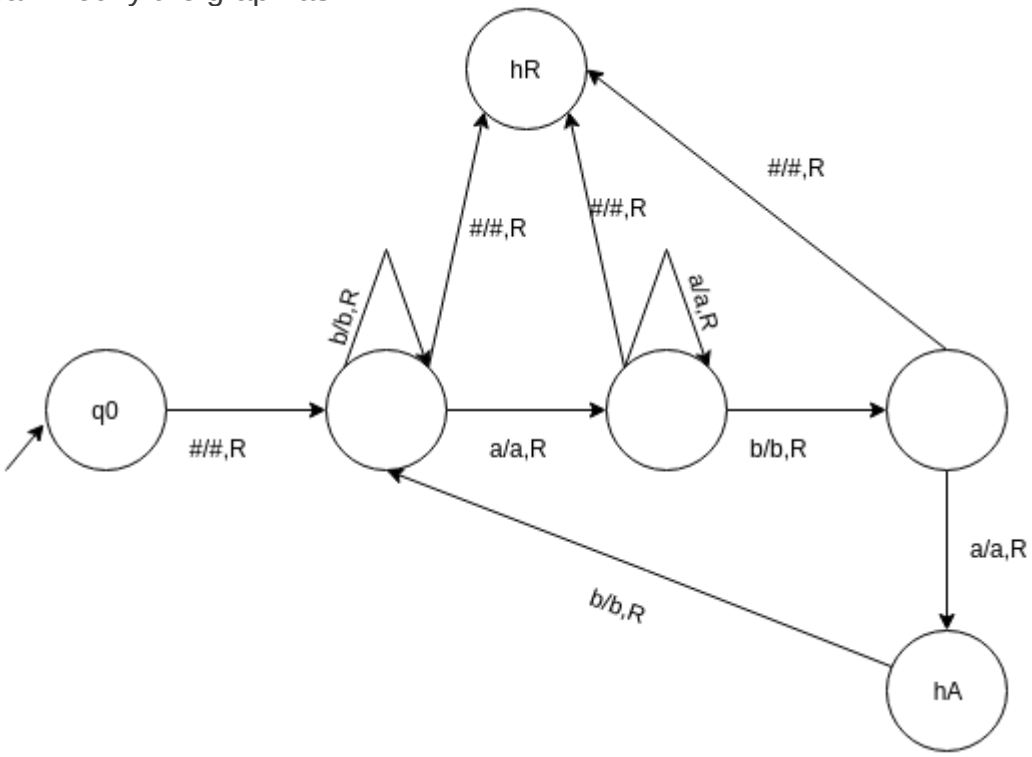
d)

View Answer

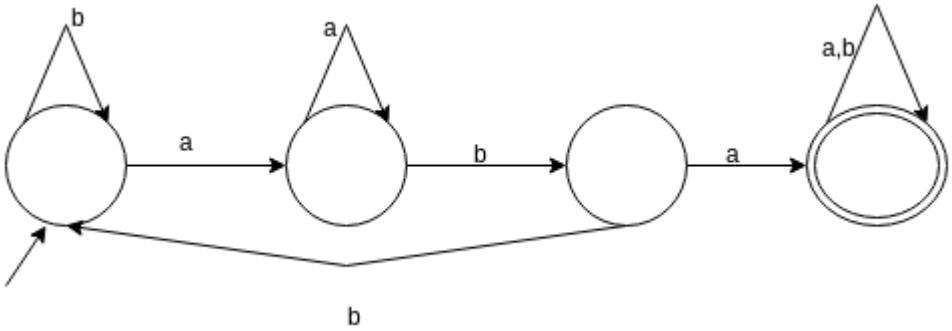
Answer: c

Explanation: The language consist of strings with a substring ‘aba’ as fixed at its end and the left part can be anything including epsilon. Thus the turing machine uses five states to express the language excluding the rejection halting state which if allowed

can modify the graph as:



3. The number of states required to automate the last question i.e. {a,b}*{aba}{a,b}* using finite automata:
a) 4
b) 3
c) 5
d) 6
View Answer
Answer: a
Explanation: The finite automata can be represented as:



4. The machine accept the string by entering into hA or it can:
a) explicitly reject x by entering into hR
b) enter into an infinte loop
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: Three things can occur when a string is tested over a turing machine:
a) enter into accept halting state

b) enter into reject halting state
c) goes into loop forever

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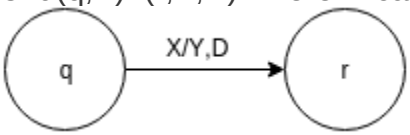
5. d(q,X)=(r,Y,D) where D cannot be:



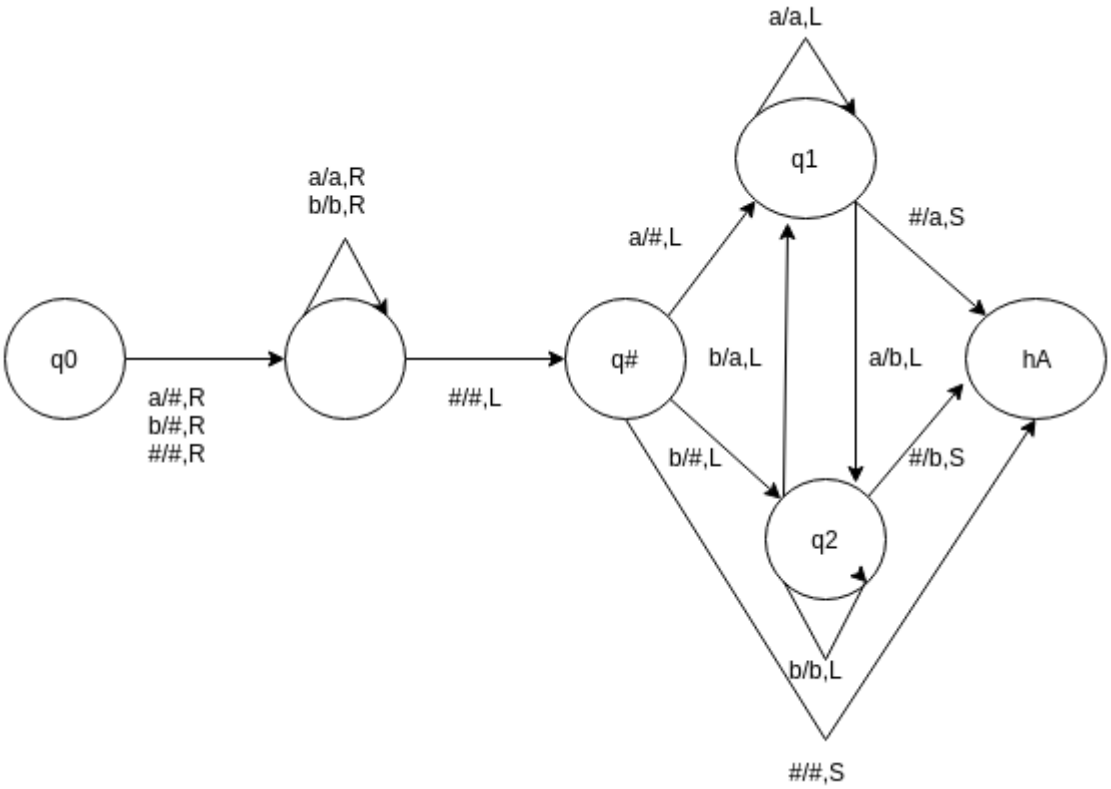
a) L
b) R
c) S
d) None of the mentioned
View Answer
Answer: c
Explanation: D represents the direction in which automata moves forward as per the queue which surely cannot be a starting variable.

6. Which of the following can accept even palindrome over {a,b}
a) Push down Automata
b) Turing machine
c) NDFA
d) All of the mentioned
View Answer
Answer: c
Explanation: A language generating strings which are palindrome is not regular, thus cannot b represented using a finite automaton.

7. Which of the functions can a turing machine not perform?
a) Copying a string
b) Deleting a symbol
c) Accepting a pal
d) Inserting a symbol
View Answer
Answer: d
Explanation: Different turing machines exist for operations like copying a string, deleting a symbol, inserting a symbol and accepting palindromes.

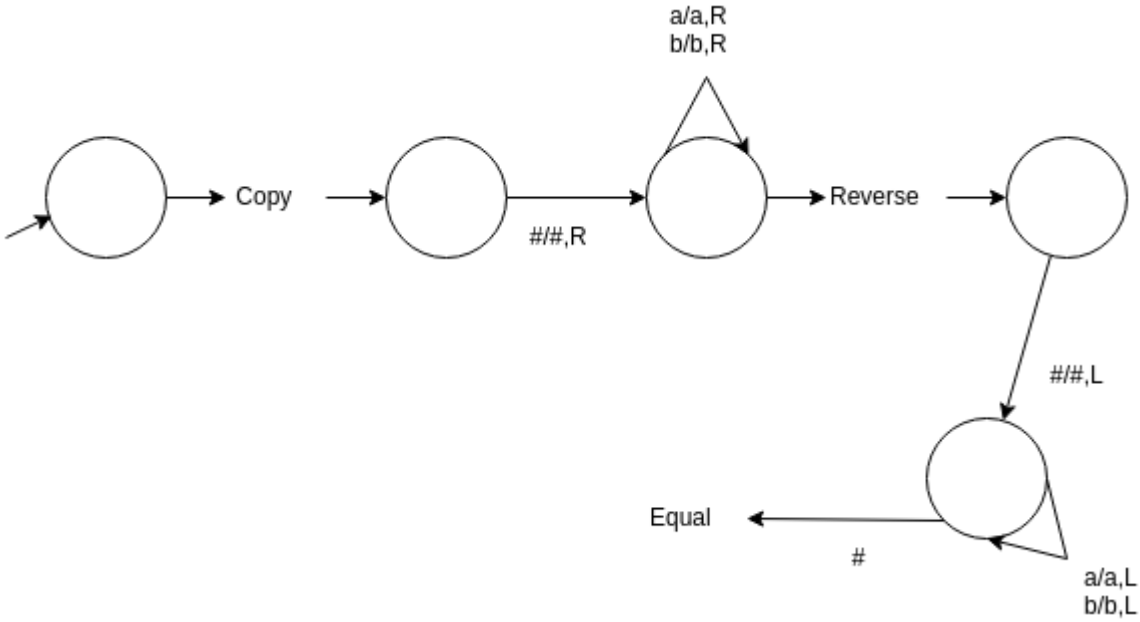
8. If T1 and T2 are two turing machines. The composite can be represented using the expression:
a) T1T2
b) T1 U T2
c) T1 X T2
d) None of the mentioned
View Answer
Answer: a
Explanation: If T1 and T2 are TMs, with disjoint sets of non halting states and transition function d1 and d2, respectively, we write T1T2 to denote this composite TM.

9. The following turing machine acts like:



a) Copies a string
b) Delete a symbol
c) Insert a symbol
d) None of the mentioned
View Answer
Answer: b
Explanation: A turing machine does the deletion by changing the tape contents from yaz to yz, where y belongs to (S U {#})*.

10. What does the following transition graph shows:

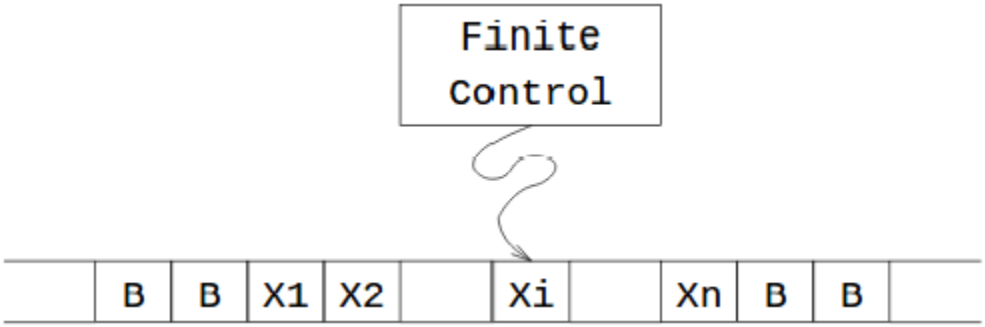


a) Copies a symbol
b) Reverses a string
c) Accepts a pal
d) None of the mentioned
View Answer
Answer: c
Explanation: The composite TM accepts the language of palindromes over {a, b} by comparing the input string to its reverse and accepting if and only if the two are equal.

1. A turing machine has _____ number of states in a CPU.
a) finite
b) infinte
c) May be finite
d) None of the mentioned
View Answer
Answer: a
Explanation: A turing machine has finite number of states in its CPU. However the states are not small in number. Real computer consist of registers which can store values (fixed number of bits).

2. Suppose we have a simple computer with control unit holding a PC with a 32 bit address + Arithmetic unit holding one double length 64 bit Arithmetic Register. The number of states the finite machine will hold:
a) $2^{(32*64)}$
b) 2^{96}
c) 96
d) 32
View Answer
Answer: b
Explanation: According to the statistics of the question, we will have a finite machine with 2^96 states.

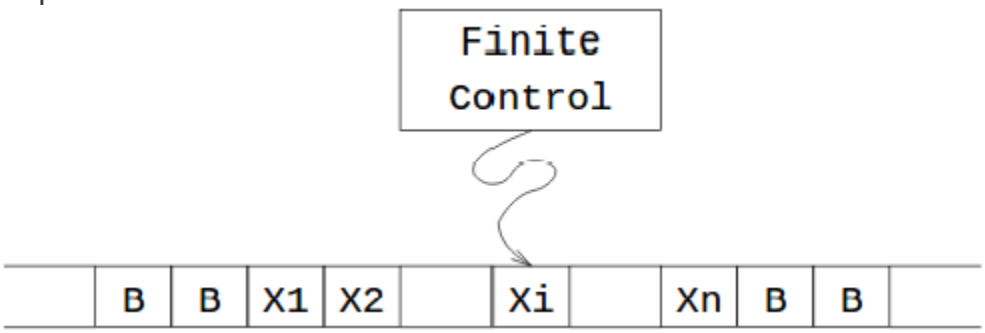
3. In one move a turing machine will:



a) Change a state
b) Write a tape symbol in the cell scanned
c) Move the tape head left or right
d) All of the mentioned
View Answer

Answer: d
Explanation: A move of a turing machine is the function of the state of finite control and the tape symbol just scanned.

4. State true or false:
Statement: We can use the finite control of turing machine to hold a finite amount of data.
a) true
b) false
View Answer
Answer: a
Explanation:



The finite control not only contains state q but also three data, A, B, C. The following technique requires no extension to the Turing Machine model. Shaping states this way allows to describe transitions in more systematic way and often to simplify the strategy of the program.

5. Statement 1: Multitrack Turing machine.
Statement 2: Gamma is Cartesian product of a finite number of finite sets.
Which among the following is the correct option?
a) Statement 1 is the assertion and Statement 2 is the reason
b) Statement 1 is the reason and Statement 2 is the assertion
c) Statement 1 and Statement 2 are independent from each other
d) None of the mentioned
View Answer
Answer: a
Explanation: Cartesian product works like a struct in C/C++. For Example: Computer tape storage is something like 8 or 9 bits in each cell. One can recognize a multi track tape machine by looking at the transitions because each will have tuples as the read and write symbols.

6. A multi track turing machine can described as a 6-tuple (Q, X, S, d, q0, F) where X represents:
a) input alphabet
b) tape alphabet
c) shift symbols
d) none of the mentioned
View Answer
Answer: b
Explanation: The 6-tuple (Q, X, S, d, q0, F) can be explained as:

Q represents finite set of states,
X represents the tape alphabet,
S represents the input alphabet
d represents the relation on states and the symbols
q0 represents the initial state
F represents the set of final states.

7. Which of the following statements are false?
a) A multi track turing machine is a special kind of multi tape turing machine
b) 4-heads move independently along 4-tracks in standard 4-tape turing machine
c) In a n-track turing machine, n head reads and writes on all the tracks simultaneously.
d) All of the mentioned
View Answer
Answer: c
Explanation: In a n-track turing machine, one head reads and writes on all the tracks simultaneously.

8. State true or false:
Statement: Two track turing machine is equivalent to a standard turing machine.
a) true
b) false
View Answer
Answer: a
Explanation: This can be generalized for n- tracks and can be proved equivalent using ennumerable languages.

9. Which of the following is/are not true for recursively ennumerable language?
a) partially decidable
b) Turing acceptable
c) Turing Recognizable
d) None of the mentioned
View Answer
Answer: d
Explanation: In automata theory, a formal language is called recursively ennumerable language or partially decidable or semi decidable or turing acceptable or turing recognizable if there exists a turing machine which will ennumerate all valid strings of the language.

10. According to Chomsky hierarchy, which of the following is adopted by Recursively Ennumerable language?
a) Type 0
b) Type 1
c) Type 2
d) Type 3
View Answer
Answer: a
Explanation: Recursively Ennumerable languages are type 0 languages in the Chomsky hierarchy. All regular, context free, context sensitive languages are recursivelyennumerable language.

1. A turing machine with several tapes in known as:
a) Multi-tape turing machine
b) Poly-tape turing maching
c) Universal turing machine
d) All of the mentioned
View Answer
Answer: a
Explanation: A multitape turing machine is an ordinary turing machine with multiple tapes. Each tape has its own head to control the read and write.

2. A multitape turing machine is _____ powerful than a single tape turing machine.
a) more
b) less
c) equal
d) none of the mentioned
View Answer
Answer: a
Explanation: The multitape turing machine model seems much powerful than the single tape model, but any multi tape machine, no matter how many tapes, can be simulated by single taped TM.

3. In what ratio, more computation time is needed to simulate multitape turing machines using single tape turing machines?
a) doubly
b) triple
c) quadratically
d) none of the mentioned
View Answer
Answer: c
Explanation: Thus, multitape turing machines cannot calculate any more functions than single tape machines.

4. Which of the following is true for two stack turing machines?
a) one read only input
b) two storage tapes
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: c
Explanation: Two-stack Turing machines have a read-only input and two storage tapes. If a head moves left on either tape a blank is printed on that tape, but one symbol from a “library” can be printed.

5. Which of the following is not a Non deterministic turing machine?
a) Alternating Turing machine
b) Probabalistic Turing machine
c) Read-only turing machine

d) None of the mentioned
View Answer
Answer: c
Explanation: A read only turing machine or 2 way deterministic finite automaton is a class of model of computability that behaves like a turing machine, and can move in both directions across input, except cannot write to its input tape.

6. Which of the turing machines have existential and universal states?
a) Alternating Turing machine
b) Probalistic Turing machine
c) Read-only turing machine
d) None of the mentioned
View Answer
Answer: a
Explanation: ATM is divide into two sets: an existential state is accepting if some transitions leads to an accepting state; an universal state is accepting if every transition leads to an accepting state.

7. Which of the following is false for Quantum Turing machine?
a) Abstract machine
b) Any quantum algorithm can be expressed formally as a particular quantum turing machine
c) Gives a solution to 'Is a universal quantum computer sufficient'
d) None of the mentioned
View Answer
Answer: c
Explanation: 'Is a universal quantum computer sufficient' is one of the unsolved problem from physics.

8. A deterministic turing machine is:
a) ambiguous turing machine
b) unambiguous turing machine
c) non-deterministic
d) none of the mentioned
View Answer
Answer: b
Explanation: A deterministic turing machine is unambiguous and for every input, there is exactly one operation possible. It is a subset of non-deterministic Turing machines.

9. Which of the following is true about Turing's a-machine?
a) a stands for automatic
b) left ended, right end-infinite
c) finite number of tape symbols were allowed
d) all of the mentioned
View Answer
Answer: d
Explanation: Turings a- machine or automatic machine was left ended,right end infinite.Any of finite number of tape symbols were allowed and the 5 tuples were not in order.

10. Which of the following is a multi tape turing machine?
a) Post turing Machine
b) Wang-B Machine
c) Oblivious turing Machine
d) All of the mentioned
View Answer
Answer: c
Explanation: An oblivious turing machine where movements of various heads are fixed functions of time, independent of the input. Pippenger and Fischer showed that any computation that can be performed by a multi-tape Turing machine in n steps can be performed by an oblivious two-tape Turing machine in O(n log n) steps.

1. Which of the following are related to construction of One Tape turing machines?
a) JFLAP
b) NFLAP
c) Both (a) and (b)
d) None of the mentioned
View Answer
Answer: a
Explanation: JFLAP is educational software written in java to experiment with the topics in automata theory and area of formal languages.

2. Which of the following topics cannot be covered using JFLAPS?
a) L-System
b) Unrestricted Grammar
c) Regular Expression
d) None of the mentioned
View Answer
Answer: d
Explanation: Topics like regular expressions, context free languages and unrestricted grammar including parsers like LL,SLR parsers can be covered using JFLAPS.

3. State true or false:
Statement: Multitape turing machine have multi tapes where each tape is accessed with one head.
a) true
b) false
View Answer
Answer: b
Explanation: Multitape turing machines do have multiple tapes but they they are accessed by separate heads.

4. Which of the following statements is/are true?
a) Every multitape turing machine has its equivalent single tape turing machine
b) Every multitape turing machine is an abstract machine
c) Both (a) and (b)
d) None of the mentioned
View Answer

Answer: c
Explanation: A multitape turing machine is an ordinary turing machine which is always abstract.And they do have their equivalent single tape turing machines.

5. Are Multitape and Multitrack turing machines same?
a) Yes
b) No
c) Somewhat yes
d) Cannot tell
View Answer
Answer: a
Explanation: Multitrack turing machines are special types of Multitape turing machines. In a standard n-tape Turing machine, n heads move independently along n-tracks.

6. In a n-track turing machine, _____ head/heads read and write on all tracks simultaneously.
a) one
b) two
c) n
d) infinite
View Answer
Answer: a
Explanation: In a n-track Turing machine, one head reads and writes on all tracks simultaneously. A tape position in a n-track Turing Machine contains n symbols from the tape alphabet.

7. Which of the following does not exists?
a) Turing Machine with Multiple heads
b) Turing Machine with infinite tapes
c) Turing machine with two dimensional tapes
d) None of the mentioned
View Answer
Answer: d
Explanation: All of the mentioned are one or the other kind of Turing machines in existence.

8. Can a multitape turing machine have an infinte number of tapes?
a) Yes
b) No
View Answer
Answer: b
Explanation: One needs a finite number of tapes. The proofs that show the equivalence between multi-tape TM and one-band TM rely on the fact that the number of tapes is bounded.

9. Every language accepted by a k-tape TM is _____ by a single-tape TM.
a) accepted
b) not accepted

c) generated
d) not generated
View Answer
Answer: a
Explanation: Its the theorem that states Every multitape turing machine can be simulated by a single tape turing machine and the corresponding language can be accepted.

10. Which of the following is/are a basic TM equivalent to?
a) Multitrack TM
b) Multitape TM
c) Non-deterministic TM
d) All of the mentioned
View Answer
Answer: d
Explanation: Tms can be used as both: language recognizers/Computers. TMs are like universal computing machines with universal storage.

1. X is a simple mathematical model of a computer. X has unrestricted and unlimited memory. X is a FA with R/W head. X can have an infinite tape divided into cells, each cell holding one symbol.
Name X?
a) Push Down Automata
b) Non deterministic Finite Automata
c) Turing machines
d) None of the mentioned
View Answer
Answer: c
Explanation: Turing machine is known as universal computer. It is denoted by $M=(Q,\Sigma,\Gamma',\delta,q0,B,F)$

2. Which of the following is/are not an application of turing machine?
a) Language Recognization
b) Computers of functions on non negative numbers
c) Generating devices
d) None of the mentioned
View Answer
Answer: d
Explanation: A turing machine can have many applications like : Enumerator (A turing machine with an output printer), function computer, etc.

3. State true or false:
Statement: Turing Machine can change symbols on its tape, whereas the FA cannot change symbols on tape.
a) true
b) false
View Answer
Answer: a
Explanation: The following mentioned is the difference between 2-way FA and TM. Another instance is that TM has a read/write tape head while FA doesn't.

4. Which of the following cannot be a possibility of a TM while it processes an input?
a) Enters accepting state
b) Enters non-accepting state
c) Enters infinite loop and never halts
d) None of the mentioned
View Answer
Answer: d
Explanation: The following mentioned are the only possibilities of operating a string through a turing machine.

5. Pick the odd one out.
a) Subroutines
b) Multiple tracks
c) Shifting over
d) Recursion
View Answer
Answer: d
Explanation: Except Recursion, all the other options are techniques of Turing Machine construction which further includes, Checking off symbols and Storage in finite control.

6. Which among the following is not true for 2-way infinte TM?
a) tape in both directions
b) Leftmost square not distinguished
c) Any computation that can be performed by 2-way infinite tape can also be performed by standard TM.
d) None of the mentioned
View Answer
Answer: d
Explanation: All of the mentioned are correct statements for a two way infinite tape turing machine. Theorems say the power of such a machine is in no way superior than a standard turing machine.

7. Can a turing machine act like a transducer?
a) yes
b) no
View Answer
Answer: a
Explanation: A turing machine can be used as a transducer. The most obvious way to do this is to treat the entire non blank portion of the initial tape as input, and to treat the entire blank portion of the tape when the machine halts as output.

8. Which of the following does not exists?
a) Mutitape TM
b) Multihead TM
c) Multidimentional TM
d) None of the mentioned
View Answer

Answer: d
Explanation: If the tape contains k-dimentional array of cells infinte in all 2^k directions, for some fixed k and has a finite control, the machine can be called Multidimentional TM.

9. Enumerator is a turing machine with _____
a) an output printer
b) 5 input tapes
c) a stack
d) none of the mentioned
View Answer
Answer: a
Explanation: Here, the turing machine can use the printer as an output device to print strings.
Note: There is no input to an enumerator. If it doesn't halt, it may print an infinite set of strings.

10. For the following language, an enumerator will print:
$L=\{a^nb^n|n>=0\}$
a) a^nb^n
b) $\{ab, a^2b^2, a^3b^3, \ldots\}$
c) $\{e, ab, a^2b^2, a^3b^3, \ldots\}$
d) None of the mentioned
View Answer
Answer: b
Explanation: An enumerator is a turing machine with an output printer. It can use an printer as an output device to print output strings. As n also holds the value , epsilon will also be a part of the output set.

11. Complete the following statement:
Statement : A language is turing recognizable if an only if _____
a) an enumerator enumerates it
b) it is finite
c) both (a) and (b)
d) none of the mentioned
View Answer
Answer: a
Explanation: If an Enumerator E enumerates a language L, there is a turing machine M that recognizes language L. Also, If a turing machine M recognizes a language L, there is an enumerator for L.

1. Can a single tape turing machine be simulated using deterministic 2-stack turing machine?
a) Yes
b) No
c) Cannot be said
d) none of the mentioned
View Answer
Answer: a
Explanation: The symbols to left of the head of turing macine being simulated can be stored on the stack while the symbols on the right of the head can be placed on

another stack. On each stack, symbols closer to the TM’s head are placed closer to the top of the stack than symbols farther from the TM’s head.

2. A _____ is a multi tape turing machine whose input tape is read only.
a) Counter Machine
b) Multi-stack
c) Alternating Turing machine
d) None of the mentioned
View Answer
Answer: a
Explanation: Counter machines are offline(a multitape turing machine whose input is read only) whose storage tapes are semi-infinite and whose tape symbols contains only two symbols Z and a blank symbol B.

3. Instantaneous description of a counter machine can be described using:
a) the input tape contents
b) position of the input head
c) distance of storage heads from symbol Z
d) all of the mentioned
View Answer
Answer: d
Explanation: Instantaneous description of a counter machine can be described by the state, the input tape contents, the position of input head, and the distance of storage heads from the symbol Z. The counter machine can really store a count on each tape and tell if the count is zero.

4. Which of the following parameters cannot be used to restrict a turing machine?
a) tape alphabets
b) number of tapes
c) number of states
d) none of these
View Answer
Answer: d
Explanation: Another procedure to restrict a turing machine is to limit the size of tape alphabet or reduce the number of states. If the tape alphabets, number of tapes or number of states are limited, then there is only a finite number of different turing machine, so the restricted model is more powerful than the original one.

5. Linear Bounded Automaton is a:
a) Finite Automaton
b) Turing Machine
c) Push down Automaton
d) None of the mentioned
View Answer
Answer: b
Explanation: Linear Bounded Automaton is a type of Turing Machine where tape is not allowed to move off the portion of the tape containing the input. It is a Turing machine with limited amount of memory.

6. State true or false:
Statement: Using a two track tape, we can use a semi infinite tape to simulate an infinte tape.
a) true
b) false
View Answer
Answer: true
Explanation: A TM with a semi-infinite tape means that there are no cells to the left of the initial head position. A TM with a semi infinite tape simulates a TM with an infinite tape by using a two-track tape.

7. Which of the following is true with reference to semi-infinite tape using a two track tape?
a) Can simulate a two way tape
b) Upper track represents the head-right cells
c) Lower track represents the head-left cells
d) All of the mentioned
View Answer
Answer: d
Explanation: The upper track represents the cells of the original TM that are at the right of the initial head position. The lower track represents the cells to the left of the initial head position, but in reverse order.

8. Which among the following options are correct?
Statement 1: TMs can accept languages that are not accepted by any PDA with one stack.
Statement 2: But PDA with two stacks can accept any language that a TM can accept.
a) Statement 1 and 2, both are correct
b) Statement 1 is correct but Statement 2 is false
c) Statement 2 is correct while Statement 1 is false
d) Statement 1 and 2, both are false
View Answer
Answer: a
Explanation: Both the statements are true. Both the statements are properties of Multistack machines.

9. A two-way infinite tape turing machine is _____ superior than the basic model of the turing machine in terms of power.
a) more
b) less
c) no way
d) none of the mentioned
View Answer
Answer: c
Explanation: A two way infinite tape turing machine is a turing machine with its input tape infinte in both directions, the other component being the same as the basic model.

10. For a basic turing machine, there exists an equivalent :
a) 2-counter machine

b) 3-counter machine
c) 4-counter machine
d) All of the mentioned
View Answer
Answer: d

1. Fill in the blank with an appropriate option.
In automata theory, _____ is said to be Computationally Universal if can be used to simulate any single taped Turing Machine.
a) Computer's instruction set
b) A programming language
c) Cellular Automaton
d) All of the mentioned
View Answer
Answer: d
Explanation: Computationally Universal or Turing Complete is a set of data manipulation rules if it can be used to simulate a single-taped turing machine.

2. Give a classic example of the concept of turing complete.
a) lambda calculus
b) C++
c) Lisp
d) All of the mentioned
View Answer
Answer: d
Explanation: Most of the programming languages, conventional or unconventional are turing complete. Functional languages like Lisp and Haskell are also turing complete.

3. Let two machines be P and Q. The state in which P can simulate Q and Q can simulate P is called:
a) Turing Equivalence
b) State Equivalence
c) Universal Turing Machine
d) None of the mentioned
View Answer
Answer: a
Explanation: It is a closely related concept with Turing complete. It says, two computers P and Q are called equivalent if P can simulate Q and Q can simulate P.

4. Which of the following remarks the given statement?
Statement: Any function whose values can be computed by an algorithm, can be computed by a Turing machine.
a) Smn theorem
b) Structured Program theorem
c) Church-Turing thesis
d) None of the mentioned
View Answer
Answer: c
Explanation: The following conclusion is laid down from the Church-Turing thesis: Any function whose values can be computed by an algorithm, can be computed by a

Turing machine. If any real world computer can be simulated by a turing machine, it is Turing equivalent to a Turing Machine.

5. Which of the following can be used to simulate any turing machine?
a) Finite State Automaton
b) Universal Turing Machine
c) Counter machines
d) All of the mentioned
View Answer
Answer: b
Explanation: The computational aspect of any possible real world computer can be simulated using an Universal Turing Machine so can be any turing machine.

6. State true or false:
Statement: Inorder to show something is Turing complete, it is enough to demonstrate that it can be used to simulate some Turing complete system.
a) true
b) false
View Answer
Answer: a
Explanation: Yes it is. For instance, an imperative language is called Turing complete if it tends to have conditional branching and an ability to maintain an arbitrary number of symbols.

7. Which of the following can lack in a Universal computer?
a) Turing Complete Instruction set
b) Infinite memory
c) Infinite time
d) None of the mentioned
View Answer
Answer: d
Explanation: Real computers which are manufactured till date, all are similar to single taped turing machine. However, they have limited physical resources so they are linearly bounded complete on the contrary.

8. Which among are not the results of computational theory?
a) In general, it is impossible to predict that what a Turing-complete program will do over an arbitrarily long time.
b) It is impossible to determine for every input, whether the program will eventually stop or continue forever.
c) It is not possible to determine whether a program will return true or false.
d) None of the mentioned
View Answer
Answer: d
Explanation: All of the following mentioned are the conclusions of automata theory or computability theory.

9. Which of the games fill under the category of Turing-complete?
a) Minecraft

b) Minesweeper
c) Dwarf Fortress
d) All of the mentioned
View Answer
Answer: d
Explanation: Many games fall under the category og turing complete:
a) Minecraft
b) Minesweeper
c) Dwarf Fortress
d) Conway's Game of Life
e) Pokemon Yellow, etc.

10. Which of the following a Non-turing Complete language?
a) Regular Language
b) Context free grammars
c) Epigram
d) All of the mentioned
View Answer
Answer: There exists some computational languages which are not turing complete. Regular language which is accepted by finite automata tops the list. Other examples are pixel shader languages embedded in Direct3D and OpenGL extensions.

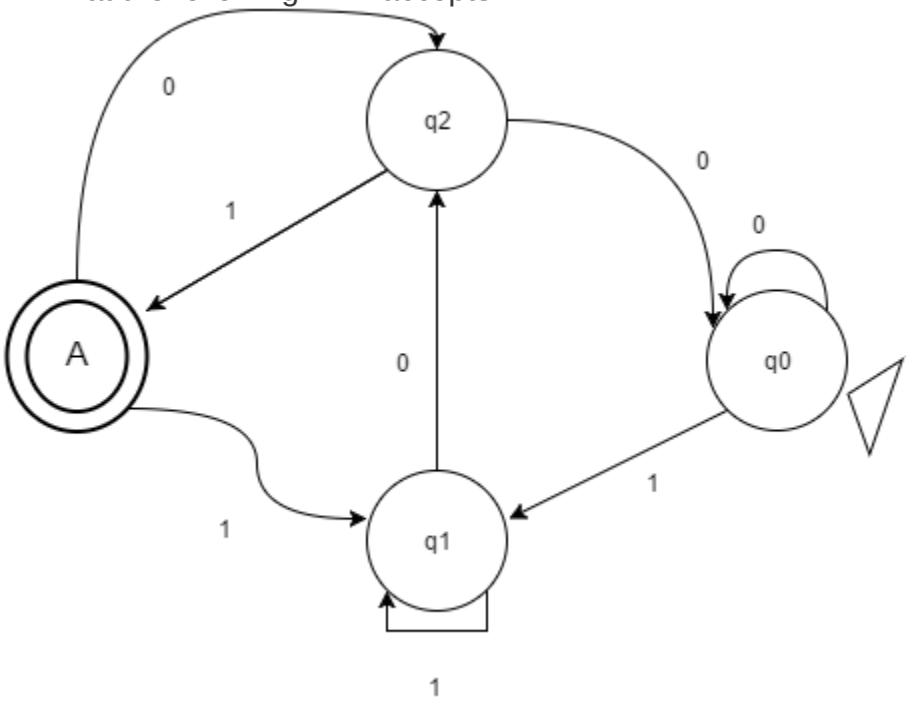
1. Which of the following not an example Bounded Information?
a) fan switch outputs {on, off}
b) electricity meter reading
c) colour of the traffic light at the moment
d) none of the mentioned
View Answer
Answer: b
Explanation: Bounded information refers to one whose output is limited and it cannot be said what were the recorded outputs previously until memorized.

2. A Language for which no DFA exist is a_____
a) Regular Language
b) Non-Regular Language
c) May be Regular
d) Cannot be said
View Answer
Answer: b
Explanation: A language for which there is no existence of a deterministic finite automata is always Non Regular and methods like Pumping Lemma can be used to prove the same.

3. A DFA cannot be represented in the following format
a) Transition graph
b) Transition Table
c) C code
d) None of the mentioned
View Answer

Answer: d
Explanation: A DFA can be represented in the following formats: Transition Graph, Transition Table, Transition tree/forest/Any programming Language.

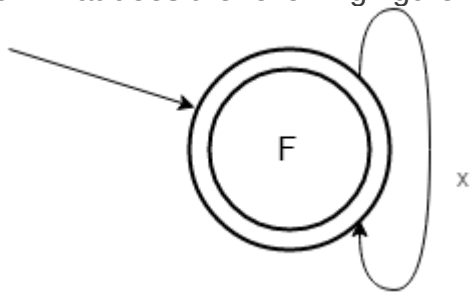
4. What the following DFA accepts?



a) x is a string such that it ends with ‘101’
b) x is a string such that it ends with ‘01’
c) x is a string such that it has odd 1’s and even 0’s
d) x is a strings such that it has starting and ending character as 1
View Answer
Answer: a
Explanation: Strings such as {1101,101,10101} are being accepted while {1001,11001} are not. Thus, this conclusion leads to option a.

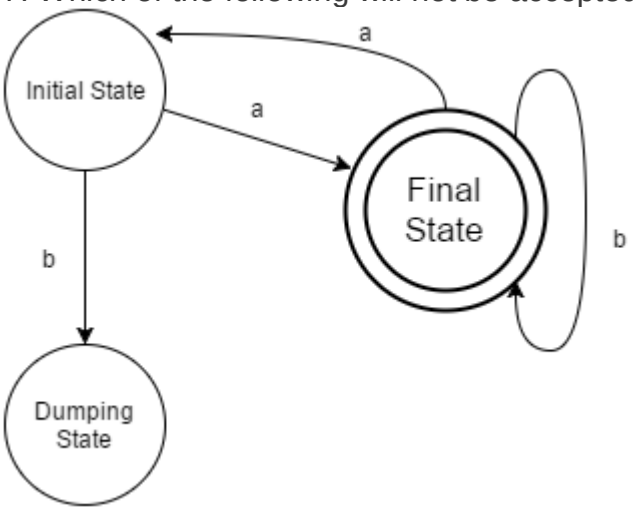
5. When are 2 finite states equivalent?
a) Same number of transitions
b) Same number of states
c) Same number of states as well as transitions
d) Both are final states
View Answer
Answer: c
Explanation: Two states are said to be equivalent if and only if they have same number of states as well as transitions.

6. What does the following figure most correctly represents?



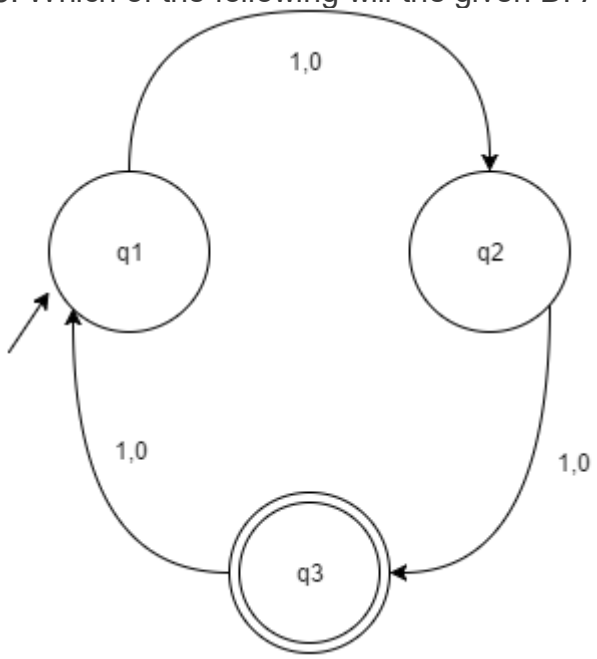
a) Final state with loop x
b) Transitional state with loop x
c) Initial state as well as final state with loop x
d) Insufficient Data
View Answer
Answer: c
Explanation: The figure represents the initial as well as the final state with an iteration of x.

7. Which of the following will not be accepted by the following DFA?



a) ababaabaa
b) abbbaa
c) abbbaabb
d) abbaabbaa
View Answer
Answer: a
Explanation: All the Strings are getting accepted except ‘ababaabaa’ as it is directed to dumping state. Dumping state also refers to the reject state of the automata.

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



a) ε
b) 11010
c) 10001010
d) String of letter count 11
View Answer
Answer: a
Explanation: As the initial state is not made an acceptance state, thus ε will not be accepted by the given DFA. For the automata to accept ε as an entity, one should make the initial state as also the final state.

9. Can a DFA recognize a palindrome number?
a) Yes
b) No
c) Yes, with input alphabet as ∑*
d) Can't be determined
View Answer
Answer: b
Explanation: Language to accept a palindrome number or string will be non-regular and thus, its DFA cannot be obtained. Though, PDA is possible.

10. Which of the following is not an example of finite state machine system?
a) Control Mechanism of an elevator
b) Combinational Locks
c) Traffic Lights
d) Digital Watches
View Answer
Answer: d

Ans. ¬To describe the complement of a language, it is very important to describe the --------- of that language over which the language is defined. A.Alphabet B.Regular Expression

C.String D.Word Ans. A ¬If L is a regular language then, --------- is also a regular language. A.Lm B.Ls C.Lx D.Lc Ans. D ¬L= language of words containing even number of a's. Regular Expression isA.(a+b)aa(a+b) B.(b+aba) C.a+bbaaba D.(a+b)ab(a+b) Ans. B

Automata Theory Objective Questions Answers gkseries.com/automata-theory/multiple-choice-questions-and-answers-on-automata-theory Questions

1 The recognizing capability of NDFSM and DFSM

A must be the same

B may be different

C must be different

D none of the above

View Answer

Answer: Option [A] The recognizing capability of NDFSM and DFSM both are same. Because it is possible to generate equivalent DFSM from NDFSM and Vice versa.

2 Pumping lemma is generally used for proving

A a given grammar is regular

B a given language is not regular

C whether two given regular expressions are equivalent

D none of the above View Answer

Answer: Option [B]

3 Why Palindromes can't be recognized by any FSM ?

A an FSM can't deterministically fix the mid-point

B an FSM can't remember arbitrarily large amount of information

C even if the mid-point is known, an FSM can't find whether the second half of the string matches the first half

D all of the above View Answer

Answer: Option [D]

4 L = {a b a | n = 1, 2, 3 ……..} is an example of a language that is n n n 1/3

A not context free but whose complement is CF

B not context free

C only [A]

D both (B) and (C) View Answer Answer: Option [D]

5 Any given Transition graph has an equivalent

A DFSM

B NDFSM

C regular expression

D all of the above

View Answer Answer: Option [D]

6 The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?

A Finite state automata

B Deterministic pushdown automata

C Non-Deterministic pushdown automata

D Turing machine

View Answer Answer: Option [A]

7 Context-free grammar is not closed under

A complementation

B union

C concatenation

D kleene star

View Answer Answer: Option [A] 2/3

8 A PDM behaves like an FSM when the number of auxiliary memory it has is

A 0 B 1 C 2 D none of the above

View Answer Answer: Option [A]

9 A PDM behaves like a TM when number of auxiliary memory it has is

A 0 B 1 C 2 or more D none of the above

View Answer Answer: Option [C]

10 Which of the following statements is/are true?

A DFSM and NDFSM both are equivalent.

B An FSM with 2 stacks is as powerful as a TM.

C A DFSM with 2 stacks and an NDFSM with 2 stacks have the same power.

D All of the above

View Answer Answer: Option [D] 3/3