UNIT-6

Turing Machine-Notation and Transition Diagrams

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

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

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

4. 'a' in a-machine is :
a) Alan
b) arbitrary
c) automatic
d) None of the mentioned
View Answer
Answer: c

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

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

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

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

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

10. State true or false:
Statement: RAM model allows random access to indexed memory locations.
a) true
b) false
Answer: a

The Language of Turing Machine

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

2. Which of the problems are unsolvable?
a) Halting problem
b) Boolean Satisfiability problem
c) Halting problem & Boolean Satisfiability problem
d) None of the mentioned
View Answer
Answer: c

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

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

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

6. Statement: Instantaneous descriptions can be designed for a Turing machine.
State true or false:
a) true
b) false
View Answer
Answer: a

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

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

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

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

11. State true or false:
Statement: RASP is to RAM like UTM is to turing machine.
a) true

b) false
View Answer
Answer: a

The Language of Turing Machine-2

1. The class of recursively enumerable language is known as:
a) Turing Class
b) Recursive Languages
c) Universal Languages
d) RE
View Answer
Answer: d

2. A language L is said to be Turing decidable if:
a) recursive
b) TM recognizes L
c) TM accepts L
d) recursive & TM recognizes L
View Answer
Answer: d

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

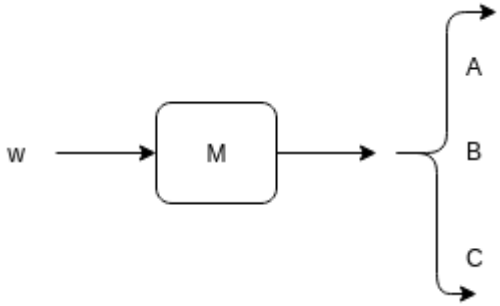
4. Choose the correct option:
Statement: If L1 and L2 are recursively enumerable languages over S, then the following is/are recursively enumerable.
a) L1 U L2
b) L2 ∩ L2
c) Both L1 U L2 and L2 ∩ L2
d) None of the mentioned
View Answer
Answer: c

5. If L is a recursive language, L’ is:
a) Recursive
b) Recursively Enumerable
c) Recursive and Recursively Enumerable
d) None of the mentioned
View Answer
Answer: c

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

7. A recursively enumerable language L can be recursive if:
a) L’ is recursively enumerable
b) Every possible sequence of moves of T, the TM which accept L, causes it to halt
c) L’ is recursively enumerable and every possible sequence of moves of T, the TM which accept L, causes it to halt
d) None of the mentioned
View Answer
Answer: c

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



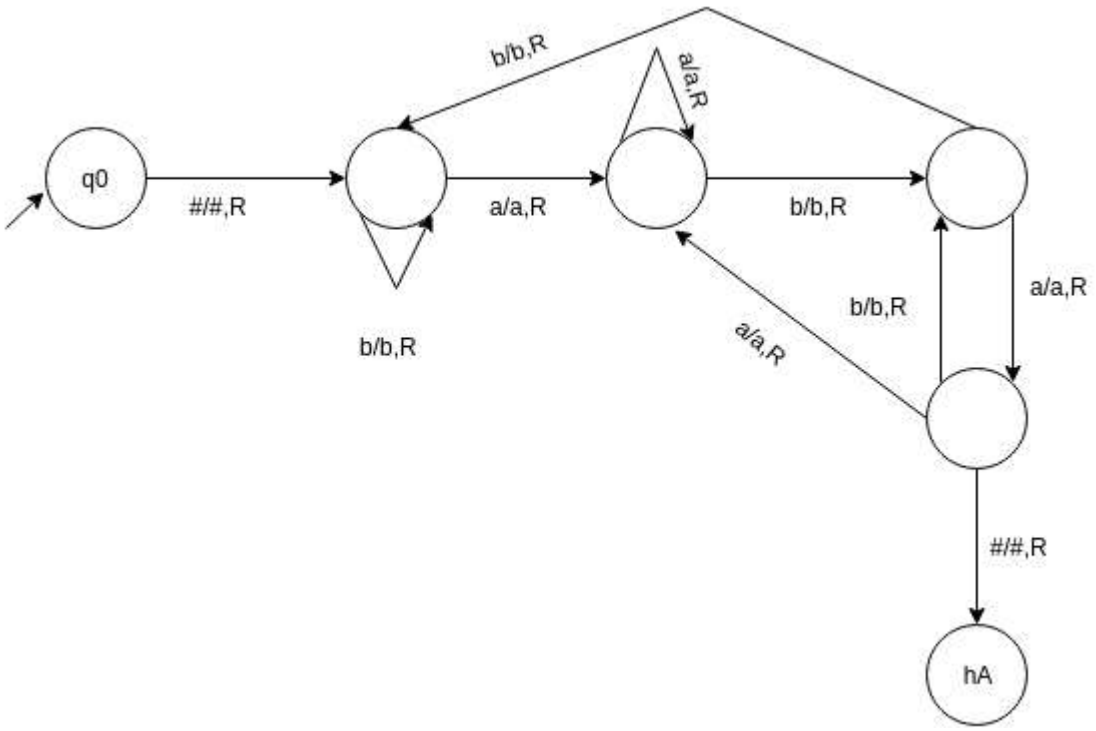
Which among the following cannot be among A, B and C?
a) yes w ∈ L
b) no w ∉ L
c) M does not halt w ∉ L
d) None of the mentioned
View Answer
Answer: d

9. State true or false:
Statement: An enumerator is a turing machine with extra output tape T, where symbols, once written, are never changed.
a) true
b) false
View Answer
Answer: a

10. A Language L may not be accepted by a Turing Machine if:
a) It is recursively enumerable
b) It is recursive
c) L can be enumerated by some turing machine
d) None of the mentioned
View Answer
Answer: b

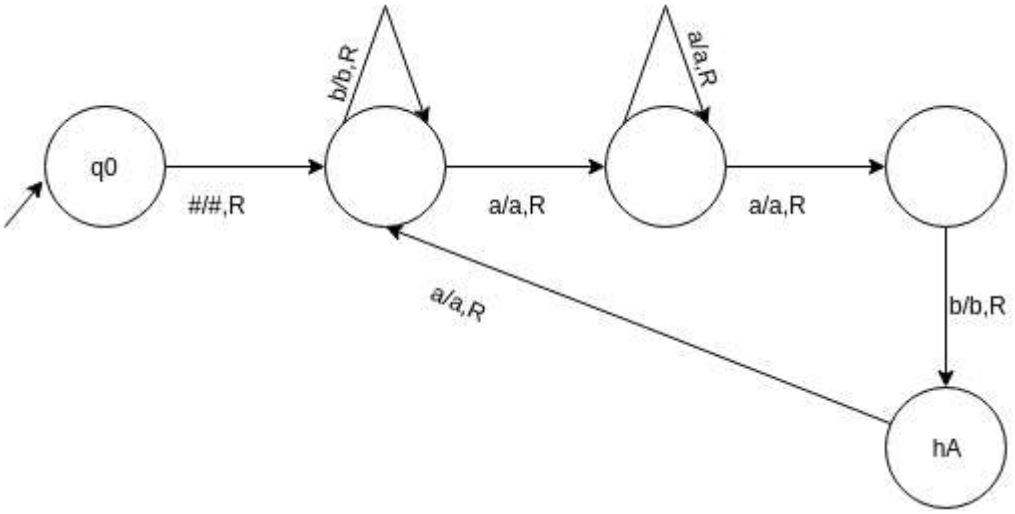
Turing Machine and Halting

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

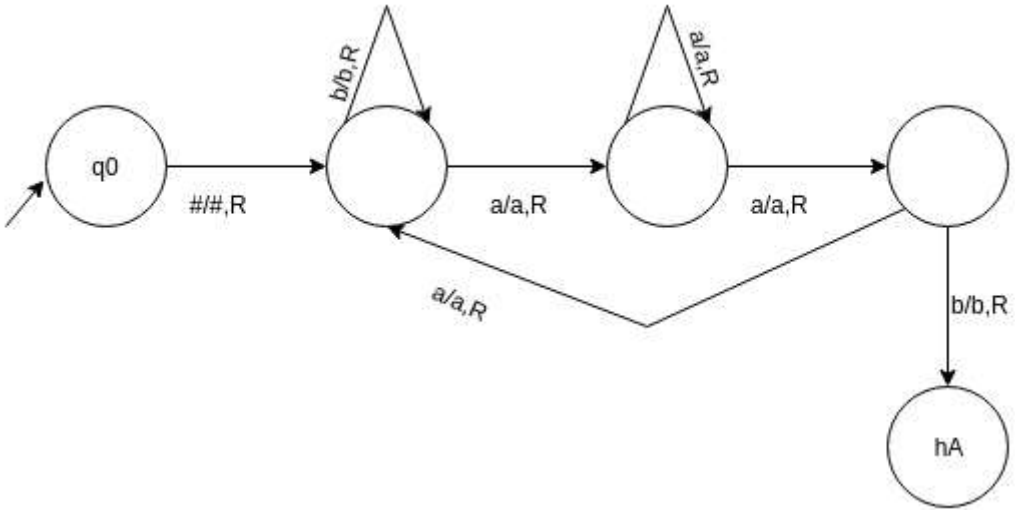


a) {a}*{b}*{a,b}
b) {a,b}*{aba}
c) {a,b}*{bab}
d) {a,b}*{a}*{b}*
View Answer
Answer: b

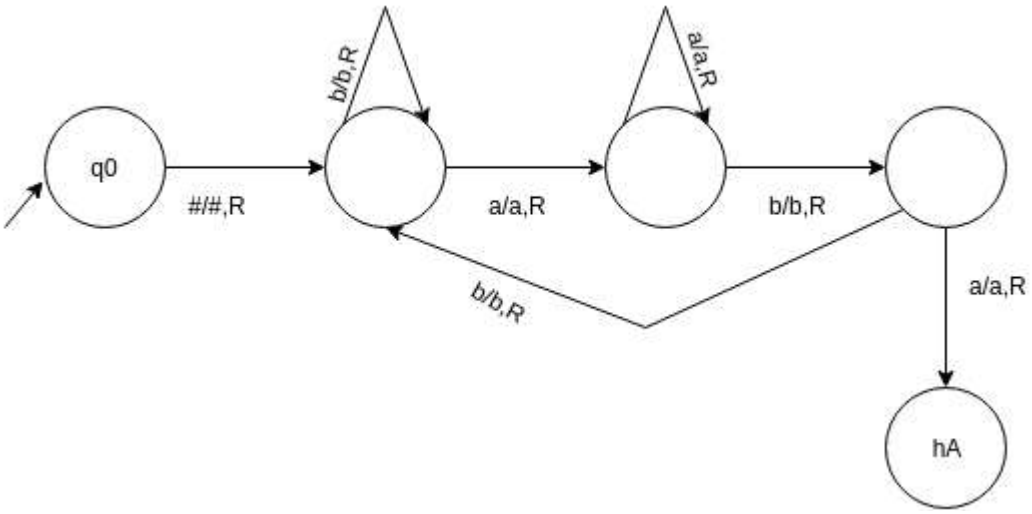
2. Construct a turing machine which accepts a string with ‘aba’ as its substring.



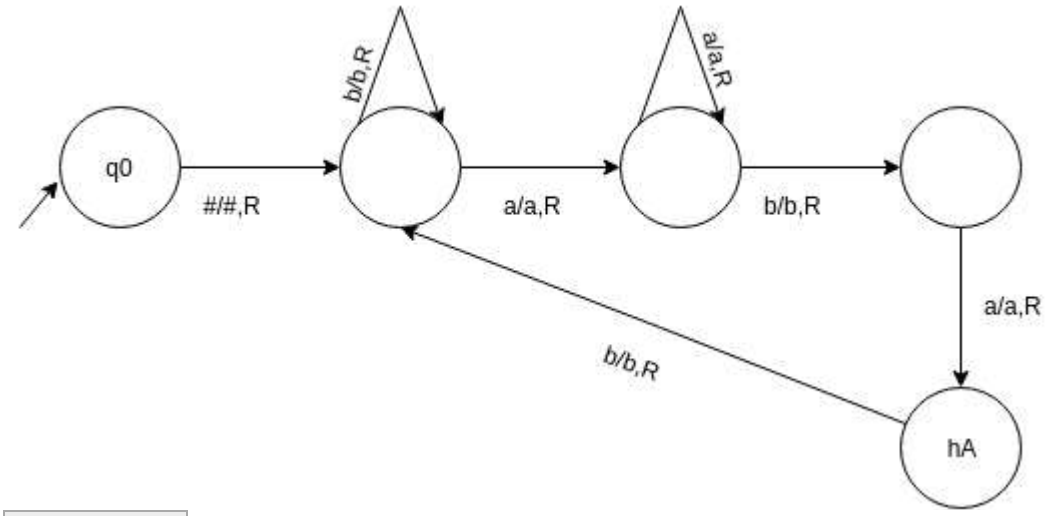
a)



b)



c)



View Answer

Answer: c

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

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

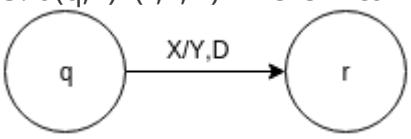
c) explicitly reject x by entering into hR and enter into an infinte loop

d) None of the mentioned

View Answer

Answer: c

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



a) L

b) R

c) S

d) None of the mentioned

View Answer

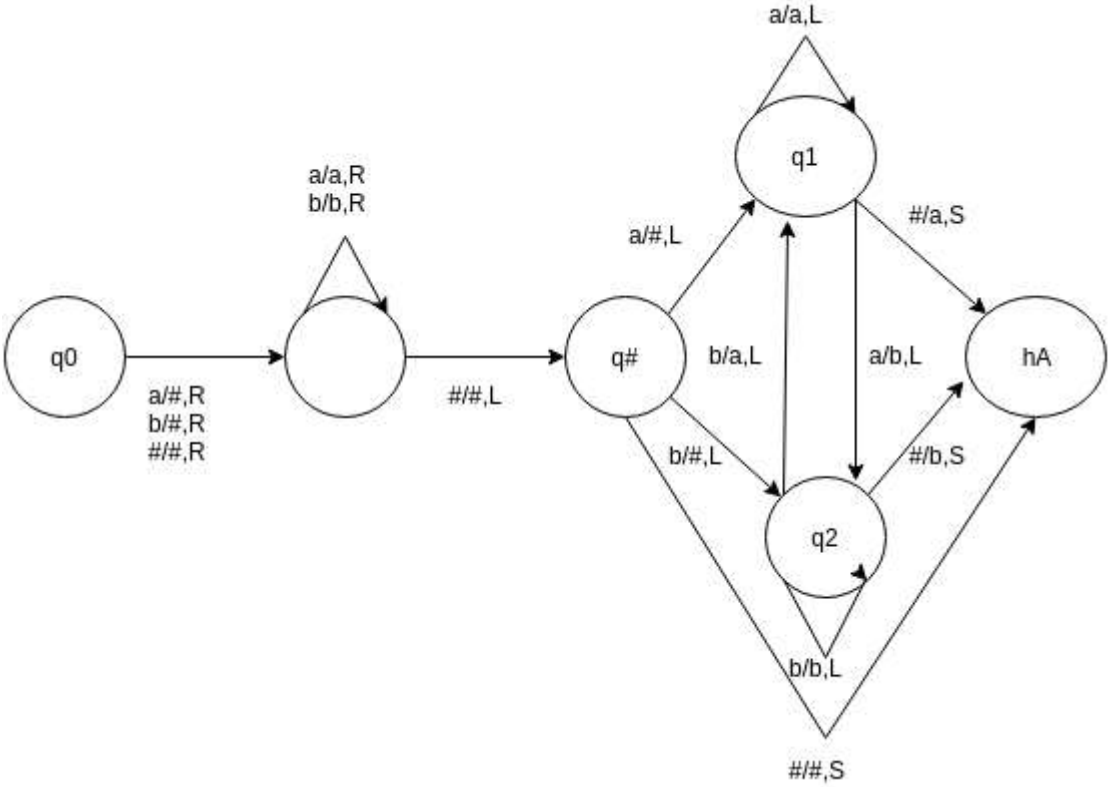
Answer: c

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

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

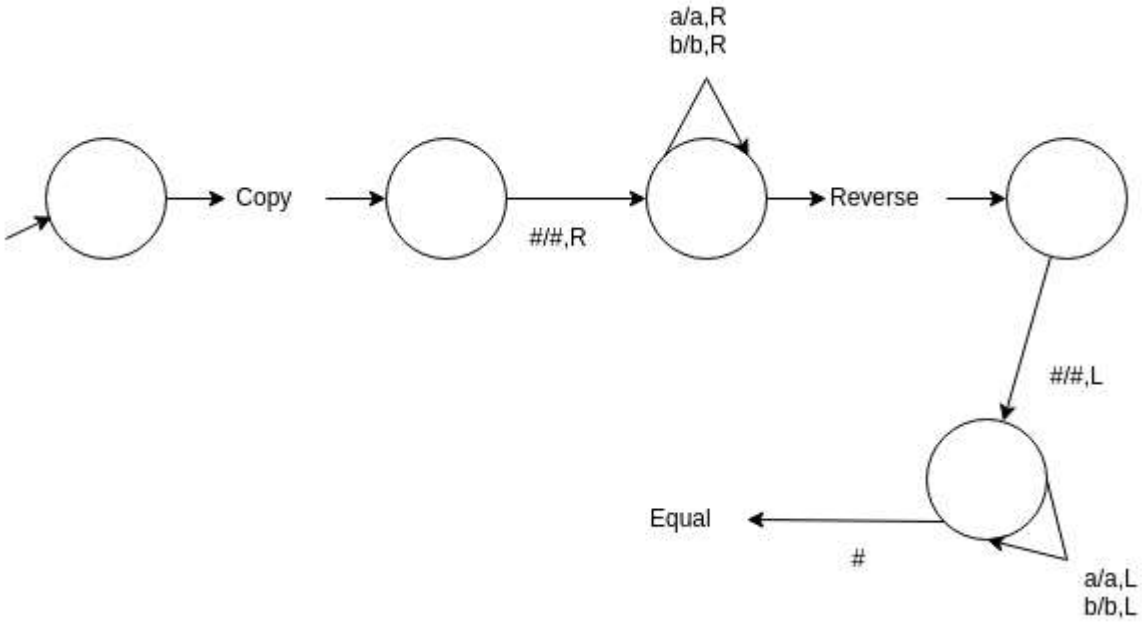
8. If T1 and T2 are two turing machines. The composite can be represented using the expression:
a) T1T2
b) T1 U T2
c) T1 X T2
d) None of the mentioned
View Answer
Answer: a

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

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

Multitape Turing Machines

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

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

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

4. Which of the following is true for two stack turing machines?
a) one read only input
b) two storage tapes
c) one read only input & two storage tapes
d) None of the mentioned
View Answer
Answer: c

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

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

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

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

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

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

Equivalence of One-Tape and Multitape TM's

1. Which of the following are related to construction of One Tape turing machines?
a) JFLAP
b) NFLAP
c) All of the mm
d) None of the mentioned
View Answer
Answer: a

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

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

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 not an abstract machine
c) All of the mentioned
d) None of the mentioned
View Answer
Answer: a

5. Are Multitape and Multitrack turing machines same?
a) Yes
b) No
c) Somewhat yes

d) Cannot tell
View Answer
Answer: a

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

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

8. Can a multitape turing machine have an infinte number of tapes?
a) Yes
b) No
View Answer
Answer: b

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

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

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

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

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

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

5. Pick the odd one out.
a) Subroutines
b) Multiple tracks
c) Shifting over
d) Recursion
View Answer
Answer: d

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

7. Can a turing machine act like a transducer?
a) yes
b) no
View Answer
Answer: a

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

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

10. For the following language, an enumerator will print:
L={$a^n b^n$ | n>=0}
a) $a^n b^n$
b) {ab, a^2b^2, a^3b^3, ...}
c) {e, ab, a^2b^2, a^3b^3, ...}
d) None of the mentioned
View Answer
Answer: b

The Diagonalization Languages

1. Which of the following technique is used to find whether a natural language isn't recursive enumerable?
a) Diagonalization

b) Recursive Induction
c) All of the mentioned
d) None of the mentioned
View Answer
Answer: a

2. Diagonalization can be useful in:
a) To find a non recursively enumerable language
b) To prove undecidability of haltig problem
c) To find a non recursively enumerable language & also proves undecidability of haltig problem
d) None of the mentioned
View Answer
Answer: c

3. Which of the following are undecidable problems?
a) Determining whether two grammars generate the same language
b) Determining whether a grammar is ambiguous
c) Determining whether a grammar is ambiguous and two grammars generate the same language
d) None of the mentioned
View Answer
Answer: c

4. Which of the following are incorrect options?
a) Informally, problem is a yes/no question about an infinite set of possible instances
b) Formally, a problem is a language
c) All of the mentioned
d) None of the mentioned
View Answer
Answer: d

5. If a problem has an algorithm to answer it, we call it _____
a) decidable
b) solved
c) recognizable
d) none of the mentioned
View Answer
Answer: a

6. Which of the following are decidable problems?
a) Can a particular line of code in a program ever be executed?

b) Do two given CFG's generate the same language
c) Is a given CFG ambiguous?
d) None of the mentioned
View Answer
Answer: d

7.Which one of the following is true for the given?
A={(M,w)|M is a turing machine that accepts string w}
a) A concrete undecidable problem
b) A is recognizable but not decidable
c) -A is not recognizable
d) All of the mentioned
View Answer
Answer: d

8. Which of the following are correct statements?
a) TMs that always halt are known as Decidable problems
b) TMs are not guaranteed to halt only on acceptance are recursive enumerable
c) All of the mentioned
d) None of the mentioned
View Answer
Answer: a

9. Statement: If L id R.E., L^c needs to be R.E. Is it correct?
a) Yes
b) No
c) Maybe
d) Cannot predict
View Answer
Answer: b

10. Which of the following is true for The Halting problem?
a) It is recursively enumerable
b) It is undecidable
c) It is recursively enumerable and undecidable
d) None of the mentioned
View Answer
Answer: c

11. With reference to binary strings, state true or false:
Statement: For any turing machine, the input alphabet is restricted to {0,1}.
a) true
b) false
View Answer
Answer: a

12. With reference to enumeration of binary strings, the conversion of binary strings to integer is possible by treating the resulting string as a base ____ integer.
a) 2
b) 8
c) 16
d) All of the mentioned
View Answer
Answer: a

The Universal Language-Undecidability

1. The decision problem is the function from string to _____
a) char
b) int
c) boolean
d) none of the mentioned
View Answer
Answer: c

2. A language L is said to be _____ if there is a turing machine M such that L(M)=L and M halts at every point.
a) Turing acceptable
b) decidable
c) undecidable
d) none of the mentioned
View Answer
Answer: b

3. Which among the following are undecidable theories?
a) The first order theory of boolean algebra
b) The first order theory of Euclidean geomentry
c) The first order theory of hyperbolic geometry
d) The first order theory of the natural number with addition, multiplication, and

equality
View Answer
Answer: d

4. Rec-DFA = { | M is a DFA and M recognizes input w}.
Fill in the blank:
Rec-DFA is _____
a) Undecidable
b) Decidable
c) Non finite
d) None of the mentioned
View Answer
Answer: b

5. Which among the following are semi decidable?
a) Empty-DFA
b) Rec-NFA
c) Infinite-DFA
d) All of the mentioned
View Answer
Answer: d

6. The language accepted by a turing machine is called _____
a) Recursive Ennumerable
b) Recursive
c) Recursive Ennumerable and Recursive
d) None of the mentioned
View Answer
Answer: c

7. Decidable can be taken as a synonym to:
a) recursive
b) non recursive
c) recognizable
d) none of the mentioned
View Answer
Answer: a

8. The problems which have no algorithm, regardless of whether or not they are accepted by a turing machine that fails to halts on some input are referred as:
a) Decidable
b) Undecidable
c) Computable
d) None of the mentioned
View Answer
Answer: b

9. An algorithm is called efficient if it runs in _____ time on a serial computer.
a) polynomial
b) non polynomial
c) logarithmic
d) none of the mentioned
View Answer
Answer: a

10. A problem is called _____ if its has an efficient algorithm for itself.
a) tractable
b) intractable
c) computational
d) none of the mentioned
View Answer
Answer: a

11. A formal language is recursive if :
a) a total turing machine exists
b) a turing machine that halts for every input
c) turing machine rejects if the input does not belong to the language
d) all of the mentioned
View Answer
Answer: d

12. Recursive languages are also known as:
a) decidable
b) undecidable
c) sometimes decidable
d) none of the mentioned
View Answer
Answer: a

13. The class of recursive language is known as:
a) R
b) RC
c) RL

d) All of the mentioned
View Answer
Answer: a

14. Which of the following was not a part of Chomsky hierarchy?
a) Context sensitive grammar
b) Unrestricted grammar
c) Recursive grammar
d) None of the mentioned
View Answer
Answer: c