QUESTION BANK

Q1. Choose the correct statement. [GATE 2003]

The set of all strings over an alphabet $\Sigma=\{0,1\}$ with the concatenation operator for strings

a) does not form a group
b) forms a noncommutative group
c) does not have a right identity
d) forms a group if the empty string is removed from Σ^*

Q2. Consider the set of all strings Σ^* over an alphabet $\Sigma=\{a,b\}$ with the concatenation operator for strings, and choose the false statement

a) the set does forms semigroup
b) the set does not form a group
c) the set has a left and right identity
d) the set forms a monoid

Q3. Consider the set of all strings Σ^* over the alphabet $\Sigma=\{a,b,c,d,e\}$ with the concatenation operator for strings. Choose the false statement

a. the set has a right identity and forms a semigroup
b. the set has a left identity and forms a monoid
c. the set does not form a commutative group but has an identity
d. the set does not form a semigroup with identity

Q4. Nobody knows yet if P = NP. Consider the language L defined as follows:

L=()+1)* if P = NP

And

L=φ otherwise

Which of the following statements is true?

a) L is recursive
b) L is recursively enumerable but not recursive
c) L is not recursively enumerable
d) Whether L is recursive or not will be known after we find out if P = NP

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Q5. Consider the language defined as follows

L= {a^n b^n|n>=1} if P=NP

And

L={ww|w in (a+b)+} otherwise

Which of the following statements is true?

a) L is recursive but not context sensitive
b) L is context sensitive but not context free
c) L is context sensitive
d) What L is will be known after we resolve the P=NP question

Q6. Consider the language defined as follows
L=(0+1)* if the CSLs are closed under complement
And
L=(0*1)*0* if P=NP
And
L=(10*)1* if P is not the same as NP
Which of the following statements is true?

a) L is always a regular set
b) L does not exist
c) L is recursive but not a regular set
d) What L is will be known after the two open problems P = NP and the closure of CSLs under complement are resolved

Q7. Consider the language defined as follows
L=(0+1)* if man goes to Mars by 2020AD
And
L=0* if man never goes to the Mars
Which of the following is true?

a. L is context free language but not recursive
b. L is recursive
c. Whether L is recursive or not will be known in 2020AD
d. L is a r.e. set that is not regular

Q8. Given an arbitrary context free grammar G, we define L as below.
L=(0+1)* if G is ambiguous
And
L=φ if G is not ambiguous
Choose the true statement

a. L is a context-free language
b. L is recursive but not r.e.
c. What L is depends on whether we can determine if G is ambiguous or not
d. What L is is undecidable

Q9. Given an arbitrary turing machine M and a string w we define L as below.
L=(0*1)*0* if M halts on w
And
L=(0*1*)* if M does not halt on w
Choose the correct statement?

a. The type of L is undecidable because of the halting problem
b. L is a context-sensitive language
c. L is recursively enumerable and not context-free
d. L is context sensitive and not regular

Q10. Consider the language L defined below
L=(0+1)* if P=NP

And
L=(a^nb^n|n>=1} otherwise
Choose the false statement

a. Whether L is a regular set that is not context-free will be known after we resolve the P=NP question.
b. Whether L is context-free but not regular will be known after we resolve the P=NP question
c. L is context-sensitive
d. L is not recursive

Q11. It is undecidable if two cfls L1 and L2 are equivalent. Consider two cfls L1 and L2 and a language defined as follows
L={a^nb^nc^n|n>=234} if L1=L2
And
L={a^nb^nc^nd^n|n>=678} otherwise
Choose the correct statement.

a. L is recursive
b. L is context-free
c. We can never say anything about L as it is undecidable
d. L is regular

Q12. At present it is not known if NP is closed under complementation.
Consider L defined as below

L={w wR w| w in (0+1+2)* and wR is the reverse of w} if NP is closed under complement
And
L = {a^nb^nc^nd^ne^n|n>=34567} otherwise
Choose the correct statement

a) L is recursive
b) L is context-free and not context-sensitive
c) L is recursively enumerable but not recursive
d) We will be able to say something about L only after we resolve the NP complementation issue

Q14. Nobody knows if P=NP at present. Consider a language L as defined below
L=(0+1)* if satisfiability is in P
L=(0*1)0* if satisfiability is not in P
L=(1*0)1* if 3-sat is in P
L=(0*1*)* if 3-sat is not in P
L=(0*1*0*1*)* if 0/1 knapsack problem is in P
L=(1*0*1*0*)* if 0/1 knapsack problem is not in P
L=(0*(00)*(1*11*)*) * if max-clique problem is in P
L=(0*(00)*(1*11*)*) * if node-cover problem is not in P
L=(0*1*)****(010)* if edge-cover problem is not in P
L=(0* + 1* + (00)* + (11)*)*(0100101010)* if the chromatic problem is not in P
What can we say about the string 0000111100001111=x

a) x is always in L
b) whether x is in L or not will be known after we resolve P=NP
c) the definition of L is contradictory
d) x can never be in L

Q15. An arbitrary turing machine M will be given to you and we define a language L as follows
L=(0+00)* if M accepts at least one string
L=(0+00+000)* if M accepts at least two strings
L=(0+00+000+0000)* if M accepts at least three strings

L=(0+00+000+---+0^n) *if M accepts at least n-1 strings
Choose the correct statement.

a) We cannot say anything about L as the question of whether a turing machine accepts a string is undecidable
b) L is context-sensitive but not regular
c) L is context-free but not regular
d) L is not a finite set

Q16. We are given two context-free languages L1 and L2 and L defined as below

a) L=(0+1)* if L1=L2
b) L=((0+00+000)*(1+11+111)*)* if L1 is contained in L2
c) L=((0(10)*)*(1(01)*)* if L2 is contained in L1
d) L=(00+11+0+1)*(0+00+000)* if L1 and L2 are incomparable

Choose the correct statement

a) As all the conditions relating to L1 and L2 are undecidable we cannot say anything about L
b) L is recursively enumerable
c) L is recursive but not context-sensitive
d) L is context-sensitive but not context-free
e) L is context-free but not regular

Q17. It is undecidable if an arbitrary cfl is inherently ambiguous. We are given a cfg G and the language L is defined as below

L= (0+1)*01(0+1)* U 1*0* if L(G) is inherently ambiguous
L=(0+1)*10(0+1)* U 0*1* if L(G) is not inherently ambiguous
Choose the incorrect statement

a) L is regular
b) L iscontext-free
c) L is context-sensitive
d) The above choices can be resolved only if we know if L(G) is inherently ambiguous or not

Q18. We are given an arbitrary turing machine M and define the language L as below
L=(0*+1*)* if M halts on blank tape
L=(0+1*)* if M ever prints a 1

L=(0*+1)* if M ever enters a designated state q
L=((0+1+00+11+000+111)+)* if M accepts an infinite set
L=0*(10*)* if M accepts a finite set
L=1*(01*)* if M accepts exactly 45 strings
Choose the correct statement with reference to the string x=00000111111000000111111

a) x is in L
b) x is not in L
c) we can never decide if x is in L as all the problems of the turing machine are undecidable
d) whether x is in L depends on the particular turing machine M

Q19. We are given a language L defined as follows
L=(0+1)* if the Hamiltonian circuit problem is in P
L=(0*1*+0)* if the Traveling salesman problem is not in P
L=(0*1*1)*0* if the bin packing problem is in P
Choose the correct statement

a) the definition of L is contradictory
b) What L is will be known after we resolve the P=NP question
c) L if a finite set
d) The string 01010101001010110010101 is in L

Q20. The intersection of two cfls can simulate a turing machine computation. We are given two cfls L1 and L2 and define the language L as below

a) L=(00)* if the intersection of L1 and L2 is empty
b) L=((0(00)*)(0(00)*))* if L1 is regular
c) L=(00+0000+000000)* if L2 is not regular
d) L=(00)*+(0000)* if the complement of L1 is a cfl

Choose the correct statement

a) L is a finite set
b) L is a regular set
c) L is undecidable
d) L is recursive but not context-free

Q21. Nobody knows at present if P=NP.
Consider the definition of L below
L=(a^ib^jc^k|i>j>k} if the sum of subsets problem is in P
L=(a^ib^jc^k|i,j,k all unequal} if P is not the same as NP
Choose the correct statement

a. L is regular and not finite
b. We can tell the type of L after resolving the P=NP question
c. L is recursive and not context-free
d. L is context-free and not context-sensitive

Q22. The regular expression 0*(10*)* denotes the same set as

a. (0*1)0* b. 0 + (0 +10)* c.*0+1)*10(0+1)* d. none of the above

Q23. The regular expression 0*(10*)* denotes the same set as
a. (1*0)1* b. 0 + (0 +10)* c.*0+1)*10(0+1)* d. none of the above

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Q22. The regular expression 0*(10*)* denotes the same set as
a. (0*1)1* b. 0 + (0 +10)* c.*0+1)*10(0+1)*+0*1* d. none of the above

Q23. The regular expression (0+10)* denotes

a. the set of all strings not containing two consecutive 0's
b. the set of all strings containing two consecutive 0's
c. the set of all strings with an even number of 0's
d. none of the above

Q24. The regular expression (ε+0+00)(1+10+100)* denotes

a. the set of all strings not containing three consecutive 0's
b. the set of all strings containing three consecutive 0's
c. the set of all strings with an odd number of 0's
d. none of the above

Q25. The regular expression (00+11+(01+10)(00+11)*(01+10))* denotes

a. the set of all strings with an even number of 0s and an even number 0's and an even number of 1's
b. the set of all strings over {0,1}
c. the set of all strings with the 0's and 1's alternating
d. none of the above

Q26. If the strings of a language L can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

a) L is necessarily finite
b) L is regular but not necessarily finite
c) L is context free but not necessarily regular
d) L is recursive but not necessarily context free

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Q27. If the strings of a language L that is accepted by a turing machine can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

e) L is necessarily finite
f) L is regular but not necessarily finite
g) L is context free but not necessarily regular
h) L is recursive but not necessarily context free

Q28. If the strings of a language L that are accepted by a multidimensional turing machine M can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

i) L is necessarily finite

j) L is regular but not necessarily finite
k) L is context free but not necessarily regular
l) L is recursive but not necessarily context free

Q29. If the strings of a language L that are accepted by a 3 pebble machine M can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

m) L is necessarily finite
n) L is regular but not necessarily finite
o) L is context free but not necessarily regular
p) L is recursive but not necessarily context free

Q30. If the strings of a language L that are accepted by a multitrack turing machine M can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

q) L is necessarily finite
r) L is regular but not necessarily finite
s) L is context free but not necessarily regular
t) L is recursive but not necessarily context free

Q31. If the strings of a language L that are accepted by a nondeterminisitic, 56 pushdown tape machine M, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

u) L is necessarily finite
v) L is regular but not necessarily finite
w) L is context free but not necessarily regular
x) L is recursive but not necessarily context free

Q32. If the strings of a language L that are accepted by a nondeterministic 987 counter machine M, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

y) L is necessarily finite
z) L is regular but not necessarily finite
aa) L is context free but not necessarily regular
bb) L is recursive but not necessarily context free

Q33. If the strings of a language L that are accepted by a turing machine with 2-way infinite tape, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

cc) L is necessarily finite
dd) L is regular but not necessarily finite
ee) L is context free but not necessarily regular
ff) L is recursive but not necessarily context free

Q34. If the strings of a language L that are accepted by a 4567 headed nondeterministic turing machine,can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

gg) L is necessarily finite
hh) L is regular but not necessarily finite
ii) L is context free but not necessarily regular
jj) L is recursive but not necessarily context free

Q35. If the strings of a language L accepted by a turing machine, which has 1000 two way infinite tapes, 1000 symbols in the tape alphabet, 2000 input symbols, l345 dimensional tapes, 34567 heads, optional 345 pushdown tapes, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

kk) L is necessarily finite
ll) L is regular but not necessarily finite
mm) L is context free but not necessarily regular
nn) L is recursive but not necessarily context free

Q36. If the strings of a language L that are accepted by a machine which can keep 400 pebbles anywhere on its infinite input tape, but has no tape symbols, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

oo) L is necessarily finite
pp) L is regular but not necessarily finite
qq) L is context free but not necessarily regular
rr) L is recursive but not necessarily context free

Q37. If the strings of a language L that are accepted by a turing machine, with a whose tape alphabet is a singleton set, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

ss) L is necessarily finite
tt) L is regular but not necessarily finite
uu) L is context free but not necessarily regular
vv) L is recursive but not necessarily context free

Q38. If the strings of a language L={<M>|encoding of turing machine M}, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

ww) L is necessarily finite
xx) L is regular but not necessarily finite
yy) L is context free but not necessarily regular
zz) L is recursive but not necessarily context free

Q39. If the strings of a language L ={<M>|encoding of 45678 push down tape machines} can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

aaa) L is necessarily finite
bbb) L is regular but not necessarily finite
ccc) L is context free but not necessarily regular
ddd) L is recursive but not necessarily context free

Q40. If the strings of a language L={<M>| M is an encoding of turing machines, pushdown automata, linear bounded automata, finite automata}, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

eee) L is necessarily finite
fff) L is regular but not necessarily finite
ggg) L is context free but not necessarily regular
hhh) L is recursive but not necessarily context free

Q41. If the strings of a language L ={<M>| M is an encoding of turing machines that have more than 34567890 states}, can be effectively enumerated in lexicographic (i.e. alphabetic) order, which of the following statements is true?

iii) L is necessarily finite
jjj) L is regular but not necessarily finite
kkk) L is context free but not necessarily regular
lll) L is recursive but not necessarily context free

Q42. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aSb|SS|ε
Which of the following statements is true?

a) G is not ambiguous
b) There exist x and y in L(G) such that xy is not in L(G)
c) There exist a deterministic push down automaton that accepts L(G)
d) We can find a deterministic finite state automaton that accepts L(G)

Q43. Let G=({S},{a,b,c},R,S) be a context-free grammar where the rule set is
S→aSa|bSb|c.
Which of the following statements is true?

e) G is ambiguous
f) There exist x and y in L(G) such that xy is in L(G)
g) There exist a deterministic push down automaton that accepts L(G)
h) We can find a deterministic finite state automaton that accepts L(G)

Q44. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aSb|SSSSSSSSSSS|ε
Which of the following statements is true?

i) G is not ambiguous
j) There exist x and y in L(G) such that xy is not in L(G)
k) There exist a deterministic push down automaton that accepts L(G)
l) We can find a deterministic finite state automaton that accepts L(G)

Q45. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aSb|aaSbb|SS|ε
Which of the following statements is true?

m) G is not ambiguous

n) There exist x and y in L(G) such that xy is not in L(G)
o) There exist a deterministic push down automaton that accepts L(G)
p) We can find a deterministic finite state automaton that accepts L(G)

Q46. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aaSbb|SS|ε
Which of the following statements is true?

q) G is not ambiguous
r) There exist x and y in L(G) such that xy is not in L(G)
s) There exist a deterministic push down automaton that accepts L(G)
t) We can find a deterministic finite state automaton that accepts L(G)

Q47. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aaaSbbb|SS|ε
Which of the following statements is true?

u) G is not ambiguous
v) There exist x and y in L(G) such that xy is not in L(G)
w) There exist a deterministic push down automaton that accepts L(G)
x) We can find a deterministic finite state automaton that accepts L(G)

Q48. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→abSba|SS|ε
Which of the following statements is true?

y) G is not ambiguous
z) There exist x and y in L(G) such that xy is not in L(G)
aa) There exist a deterministic push down automaton that accepts L(G)
bb) We can find a deterministic finite state automaton that accepts L(G)

Q49. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aaabaaaSbbbabbb|SS|ε
Which of the following statements is true?

cc) G is not ambiguous
dd) There exist x and y in L(G) such that xy is not in L(G)
ee) There exist a deterministic push down automaton that accepts L(G)
ff) We can find a deterministic finite state automaton that accepts L(G)

Q50. Choose the correct statement for the language L={a^nb^n|n>=0}

a) L is inherently ambiguous
b) L is deterministic context-free
c) L is regular
d) There exists a deterministic two way finite automata accepting L

Q51. Choose the correct statement for the language L={a^100nb^100n|n>=0}

e) L is inherently ambiguous
f) L is deterministic context-free
g) L is regular
h) There exists a deterministic two way finite automata accepting L

Q52. Choose the correct statement for the language
L={(aaabaaa)^1000n(bbbbbbb)^34567n|n>=0}

i) L is inherently ambiguous

j) L is deterministic context-free
k) L is regular
l) There exists a deterministic two way finite automata accepting L

Q53. Choose the correct statement for the language L={“(“^n “)” ^n|n>=0}

m) L is inherently ambiguous
n) L is deterministic context-free
o) L is regular
p) There exists a deterministic two way finite automata accepting L

Q54. Choose the correct statement for the language L={(begin)^n(end)^n|n>=0}

q) L is inherently ambiguous
r) L is deterministic context-free
s) L is regular
t) There exists a deterministic two way finite automata accepting L

Q55. Let G=({S},{a,b},R,S) be a context-free grammar where the rule set is
S→aSb|SS|ε
Which of the following statements is true?

gg) G is not ambiguous
hh) There exist x and y in L(G) such that xy is not in L(G)
ii) L(G) is the set of all strings of balanced parenthesis with a as the opening parenthesis and b as the closing parenthesis.
jj) We can find a deterministic finite state automaton that accepts L(G)

Q56. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

a) L1 ε P and L2 finite
b) L1ε NP and L2εP
c) L1 is undecidable and L2 is decidable
d) L1 is recursively enumerable and L2 is recursive

Q57. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

e) L1 ε P and L2 finite
f) L1ε NP and L2εP-SPACE
g) L1 is undecidable and L2 is decidable
h) L1 is recursively enumerable and L2 is context-sensitive

Q58. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

i) L1 ε P and L2 regular

j) L1ε NP and L2εP
k) L1 is undecidable and L2 is decidable
l) L1 is context-sensitive and L2 is recursive

Q59. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

m) L1 ε P-SPACE and L2 ε DSPACE(n^1000)
n) L1ε NP and L2εDTIME(2^1000n)
o) L1 is undecidable and L2 is decidable
p) L1 is recursively enumerable and L2 is accepted by a 2PDA

Q60. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

q) L1 ε P and L2 is accepted by a 2NFA
r) L1ε NP and L2is accepted by a linear bounded automata
s) L1 is undecidable and L2 is decidable
t) L1 is recursively enumerable and L2 is accepted by a turing machine that halts on all inputs

Q61. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

u) L1 ε P and L2 is accepted by a deterministic push down automata
v) L1ε NP and L2εP
w) L1 is undecidable and L2 is decidable
x) L1 is recursively enumerable and L2 is accepted by a deterministic linear bounded automata

Q62. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

y) L1 ε P-SPACE and L2 is in NSPACE(2^2^2^2^n)
z) L1ε NP and L2εP
aa) L1 is undecidable and L2 is decidable
bb) L1 is recursively enumerable and L2 is finite

Q63. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

cc) L1 is finite and L2 is context-free

dd) L1ε NP and L2εNP
ee) L1 is undecidable and L2 is decidable
ff) L1 is recursively enumerable and L2 is recursive

Q64. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

gg) L1 ε P and L2 finite
hh) L1ε NP and L2εP
ii) L1 is undecidable and L2 is decidable
jj) L1 is recursively enumerable and L2 is recursive

Q65. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

kk) L1 ε context-free and L2 regular but not finite
ll) L1ε NP and L2 is accepted by a deterministic turing machine
mm) L1 is undecidable and L2 is decidable
nn) L1 is recursively enumerable and L2 is recursive but not context-sensitive

Q66. Consider two languages L1 and L2 each on the alphabet Σ. Let f: Σ->Σ be a polynomial time computable bijection such that (∇x)[xεL2]. Further, let f^-1 be also polynomial time computable.
Which of the following CANNOT be true?

oo) L1 is finite but not necessarily regular and L2 is context-free but not necessarily context-sensitive
pp) L1ε NP and L2εP
qq) L1 is undecidable and L2 is decidable
rr) L1 is recursively enumerable and L2 is recursive but not necessarily context-sensitive

Q67. Define languages L0 and L1 as follows:
L0={<M,w,0>|M halts on w}
L1={<M,w,1>| M does not halt on w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(a) L is recursively enumerable but L' is not
(b) L' is recursively enumerable but L is not
(c) Both L and L' are recursive
(d) Neither L nor L' is recursively enumerable

Q68. Define languages L0 and L1 as follows:
L0={<M,0>|M halts}

L1={<M,1>| M does not halt }
Here <M,I> is a pair whose first component, M is an encoding of a turing machine starting with blank tape, second component is a bit.
Let L=L0 U L1. Which of the following is true?

(e) L is recursively enumerable but L' is not
(f) L' is recursively enumerable but L is not
(g) Both L and L' are recursive
(h) Neither L nor L' is recursively enumerable

Q69. Define languages L0 and L1 as follows:
L0={<M,w,0>|M halts on w}
L1={<M,w,1>| M does not halt on w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a 1200 push down tape machine , second component w, is a string representing the input, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(i) L is recursively enumerable but L' is not
(j) L' is recursively enumerable but L is not
(k) Both L and L' are recursive
(l) Neither L nor L' is recursively enumerable

Q70. Define languages L0 and L1 as follows:
L0={<M,0>|M accepts at least two strings}
L1={<M,1>| M does not accept at least two strings}
Here <M,I> is a pair, whose first component, M is an encoding of a turing machine , second component I is a bit.
Let L=L0 U L1. Which of the following is true?

(m) L is recursively enumerable but L' is not
(n) L' is recursively enumerable but L is not
(o) Both L and L' are recursive
(p) Neither L nor L' is recursively enumerable

Q71. Define languages L0 and L1 as follows:
L0={<M,0>|M accepts an infinite set}
L1={<M,1>| M does not accept an infinite set}
Here <M,I> is a pair, whose first component, M is an encoding of a turing machine , second component I is a bit.
Let L=L0 U L1. Which of the following is true?

(q) L is recursively enumerable but L' is not
(r) L' is recursively enumerable but L is not
(s) Both L and L' are recursive
(t) Neither L nor L' is recursively enumerable

Q72. Define languages L0 and L1 as follows:
L0={<M,w,0>|M halts on w}
L1={<M,w,1>| M does not halt on w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a three counter machine machine , second component w is a triplet giving the initial position of the pebbles, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(u) L is recursively enumerable but L’ is not
(v) L’ is recursively enumerable but L is not
(w) Both L and L’ are recursive
(x) Neither L nor L’ is recursively enumerable

Q73. Define languages L0 and L1 as follows:
L0={<P,w,0>|P halts on w}
L1={<P,w,1>| P does not halt on w}
Here <P,w,I> is a triplet, whose first component, P is an encoding of a C++ program, second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(y) L is recursively enumerable but L’ is not
(z) L’ is recursively enumerable but L is not
(aa) Both L and L’ are recursive
(bb) Neither L nor L’ is recursively enumerable

Q74. Define languages L0 and L1 as follows:
L0={<Q,w,0>|Q halts on w}
L1={<Q,w,1>| Q does not halt on w}
Here <Q,w,I> is a triplet, whose first component, Q is an encoding of a java program, second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(cc) L is recursively enumerable but L’ is not
(dd) L’ is recursively enumerable but L is not
(ee) Both L and L’ are recursive
(ff) Neither L nor L’ is recursively enumerable

Q75. Define languages L0 and L1 as follows:
L0={<M,w,0>|M halts on w}
L1={<M,w,1>| M does not halt on w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a multidimentsional, multiheaded, multitape turing machine , second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(gg) L is recursively enumerable but L’ is not
(hh) L’ is recursively enumerable but L is not
(ii) Both L and L’ are recursive
(jj) Neither L nor L’ is recursively enumerable

Q76. Define languages L0 and L1 as follows:
L0={<M,w,0>|M halts on w}
L1={<M,w,1>| M does not halt on w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a nondeterministic 789 pushdown tape machine , second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(kk) L is recursively enumerable but L’ is not
(ll) L’ is recursively enumerable but L is not

(mm) Both L and L’ are recursive
(nn) Neither L nor L’ is recursively enumerable

Q77. Define languages L0 and L1 as follows:
L0={<M,w,0>|M accepts on w}
L1={<M,w,1>| M does not accept w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(oo) L is recursively enumerable but L’ is not
(pp) L’ is recursively enumerable but L is not
(qq) Both L and L’ are recursive
(rr) Neither L nor L’ is recursively enumerable

Q78. Define languages L0 and L1 as follows:
L0={<P,w,0>|P halts on input w}
L1={<P,w,1>| P loops on input w}
Here <P,w,I> is a triplet, whose first component, P is an encoding of a C program, second component w, is a string and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(ss) L is recursively enumerable but L’ is not
(tt) L’ is recursively enumerable but L is not
(uu) Both L and L’ are recursive
(vv) Neither L nor L’ is recursively enumerable

Q79. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a turing machine, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(ww) L is recursively enumerable but L’ is not
(xx) L’ is recursively enumerable but L is not
(yy) Both L and L’ are recursive
(zz) Neither L nor L’ is recursively enumerable

Q80. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M accepts a subset of what is accepted by M1}
L1={<M,M1,1>| M does not accept a subset of what is accepted by M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a turing machine, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(aaa) L is recursively enumerable but L’ is not
(bbb) L’ is recursively enumerable but L is not
(ccc) Both L and L’ are recursive
(ddd) Neither L nor L’ is recursively enumerable

Q81. Define languages L0 and L1 as follows:

L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a pushdown automaton machine, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(eee) L is recursively enumerable but L' is not
(fff) L' is recursively enumerable but L is not
(ggg) Both L and L' are recursive
(hhh) Neither L nor L' is recursively enumerable

Q82. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a halting turing machine, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(iii)L is recursively enumerable but L' is not
(jjj)L' is recursively enumerable but L is not
(kkk) Both L and L' are recursive
(lll)Neither L nor L' is recursively enumerable

Q83. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a finite automaton machine, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(mmm) L is recursively enumerable but L' is not
(nnn) L' is recursively enumerable but L is not
(ooo) Both L and L' are recursive
(ppp) Neither L nor L' is recursively enumerable

Q84. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a deterministic pushdown automaton, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(qqq) L is recursively enumerable but L' is not
(rrr) L' is recursively enumerable but L is not
(sss) Both L and L' are recursive
(ttt)Neither L nor L' is recursively enumerable

Q85. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a deterministic linear bounded atuomaton and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(uuu) L is recursively enumerable but L' is not
(vvv) L' is recursively enumerable but L is not
(www) Both L and L' are recursive
(xxx) Neither L nor L' is recursively enumerable

Q86. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a nondeterministic linear bounded automaton, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(yyy) L is recursively enumerable but L' is not
(zzz) L' is recursively enumerable but L is not
(aaaa) Both L and L' are recursive
(bbbb) Neither L nor L' is recursively enumerable

Q87. Define languages L0 and L1 as follows:
L0={<M,M1,0>|M is equivalent to M1}
L1={<M,M1,1>| M is not equivalent to M1}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a turing machine , second component M1 is the encoding of a 100 tape nondeterministic turing machine that halts on all inputs, and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(cccc) L is recursively enumerable but L' is not
(dddd) L' is recursively enumerable but L is not
(eeee) Both L and L' are recursive
(ffff) Neither L nor L' is recursively enumerable

Q88. Define languages L0 and L1 as follows:
L0={<M,w,0>|M in the course of its computation visits state w}
L1={<M,w,1>| M does not halt visit state w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a nondeterministic 789 pushdown tape machine , second component w, is a state and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(gggg) L is recursively enumerable but L' is not
(hhhh) L' is recursively enumerable but L is not

(iiii) Both L and L’ are recursive

(jjjj)Neither L nor L’ is recursively enumerable

Q89. Define languages L0 and L1 as follows:
L0={<M,w,0>|M prints symbol w}
L1={<M,w,1>| M never prints symbol w}
Here <M,w,I> is a triplet, whose first component, M is an encoding of a nondeterministic 789 pushdown tape machine , second component w, is a symbol and third component I is a bit.
Let L=L0 U L1. Which of the following is true?

(jjjj) L is recursively enumerable but L’ is not

(kkkk) L’ is recursively enumerable but L is not

(llll) Both L and L’ are recursive

(mmmm)Neither L nor L’ is recursively enumerable

Q90. A single tape Turing Machine M has two states q0 and q1, of which q0 is the starting state. The tape alphabet of M is {0,1, B} and its input alphabet is (0,1). The symbol B is the blank symbol used to indicate end of an input string. The transition function of M is described in the following table

	0	1	B
q0	q1,1,R	q1,1,R	Halt
q1	q1,1,R	q0,1,L	q0,B,L

The table is interpreted as illustrated below.
The entry (q1,1,R) in row q0 and column 1 signifies that if M is in state q0 and reads 1 on the current tape square, then it writes 1 on the same tape square and moves its tape head one position to the right and transitions to state q1.
Which of the following statements is true about M?

(a) M does not halt on any string in (0+1)+
(b) M does not halt on any string in (00+1)*
(c) M halts on all strings ending in a 0
(d) M halts on all strings ending in a 1

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Which of the following statements is true about M?

(e) M does not halt on any string in (0+1)+

(f) M does not halt on any string in (0+11)*
(g) M halts on all strings ending in a 0
(h) M halts on all strings ending in a 1

Q90. A single tape Turing Machine M has two states q0 and q1, of which q0 is the starting state. The tape alphabet of M is {0,1, B} and its input alphabet is (0,1). The symbol B is the blank symbol used to indicate end of an input string. The transition function of M is described in the following table

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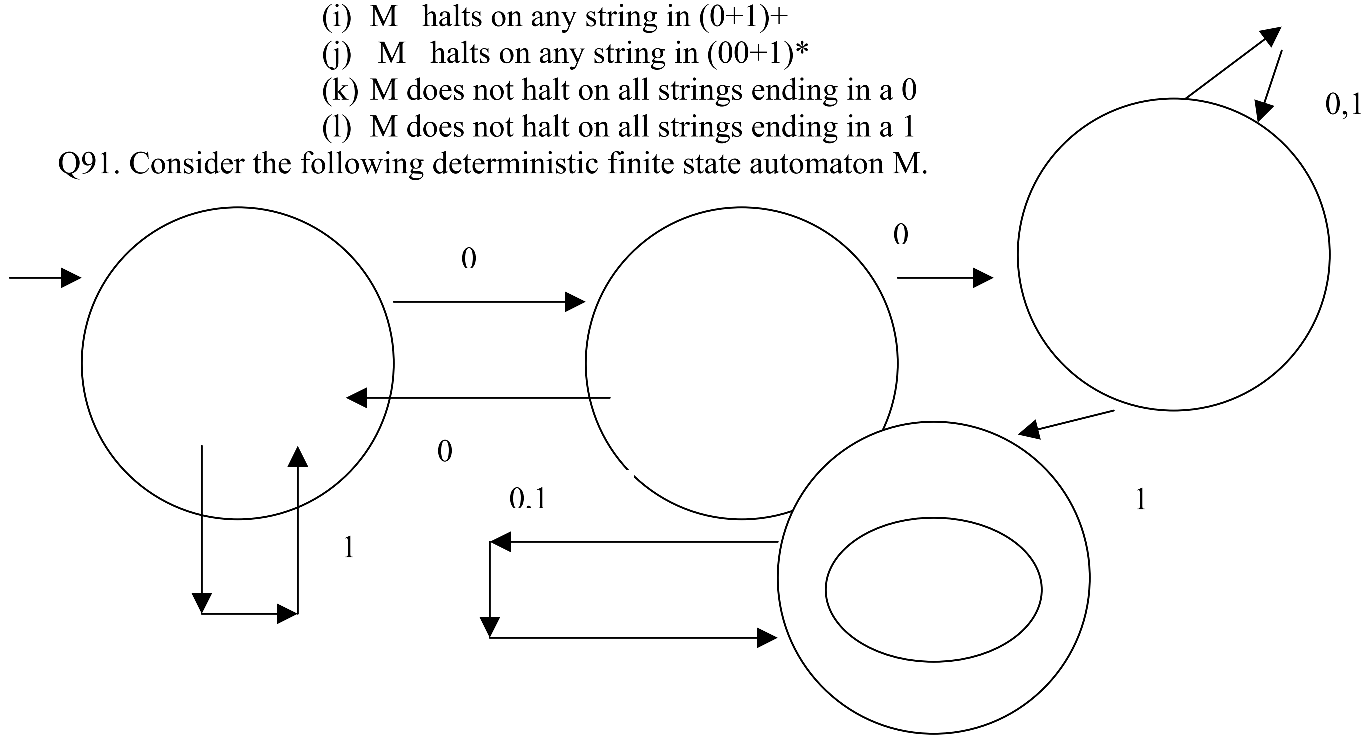
q1	q1,1,R	q0,1,L	q0,B,L

The table is interpreted as illustrated below.
The entry (q1,1,R) in row q0 and column 1 signifies that if M is in state q0 and reads 1 on the current tape square, then it writes 1 on the same tape square and moves its tape head one position to the right and transitions to state q1.
Which of the following statements is false about M?

(i) M halts on any string in (0+1)+
(j) M halts on any string in (00+1)*
(k) M does not halt on all strings ending in a 0
(l) M does not halt on all strings ending in a 1

Q91. Consider the following deterministic finite state automaton M.



Let S denote the set of all seven bit binary strings in which the first, the fourth and the last bits are 1. The number of strings in S that are accepted by M is
(a) 1 (b) 5 (c) 7 (d) 8

Q92. Consider the finite state automaton given below

	0	1
A	b	a
B	c	a
C	c	d
*D	d	d

Let S denote the set of all seven bit binary strings in which the first, the fourth and the last bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 5 (c) 7 (d) 8

Q92. Consider the finite state automaton given below

	1	0
A	b	a
B	c	a
C	c	d
*D	d	D

Let S denote the set of all seven bit binary strings in which the first, the fourth and the last bits are 0. The number of strings in S that are accepted by M is

(a) 1 (b) 5 (c) 7 (d) 8

Q93. Consider the finite state automaton given below

	0	1
A	b	a
B	c	a
C	c	d
*D	d	d

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) 8

Q94. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*D	D	d

The following can be said about the set accepted by the finite automata

a) 001 is compulsorily a substring in the language accepted
b) 011 is compulsorily a substring in thelanguage accepted
c) 0* is in the language accepted by the finite auotmata
d) 11 is compulsorily as substring of any string in the language accepted

Q95. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*D	D	d

Let S denote the set of all five bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) 8

Q96. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*D	D	d

Choose the correct statement

a) the head of any string accepted is from the language set of all strings over (0+1)* not containing two consecutive 1's
b) the set (0+1)* is accepted by the finite automata
c) the set 001(0+1)* is the language accepted by the finite auotomata
d) any string accepted has an odd no of 0's

Q96. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*D	D	d

Choose the correct statement

e) the set of all strings with an odd number of 0's(except 0) , followed by a 1 is accepted by the finite automata
f) the set (0+1)* is accepted by the finite automata
g) the set 001(0+1)* is the language accepted by the finite auotomata
h) any string accepted has an odd no of 0's

Q97. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*D	D	d

Let S denote the set of all four bit binary strings. The number of strings in S that are accepted by M is

(a) 1 (b) 3 (c) 7 (d) 8

Q98. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*D	D	d

Let S denote the set of all three. The number of strings in S that are accepted by M is

(a) 1 (b) 5 (c) 7 (d) 8

Q99. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
*d	D	d

Let S denote the set of all two bit strings. The number of strings in S that are accepted by M is

(a) 1 (b) 5 (c) 7 (d) 0

Q100. Consider the finite state automaton given below

	0	1
A	B	a
B	C	a
C	C	d
D	D	d

Let S denote the set of all one binary strings. The number of strings in S that are accepted by M is

(a) 1 (b) 5 (c) 7 (d) 0

Q101. Consider the finite automaton given below

	0	1
-→q0	φ	q1
q1	Q0	q1

The set accepted by the finite automata can be denoted by the regular expression

a) (0+1)*00
b) (0+1)*00(0+1)*
c) the complement of (0+1)*00(0+1)*
d) (0+1)*

Q102. Consider the finite automaton given below

	0	1
-→q0	φ	q1
q1	Q0	q1

The minimal finite automata corresponding to the above automaton has

a) 2 states b) 3 states d) 1 state d) no states

Q103. Consider the finite automaton given below

	0	1
-→q0	φ	q1
q1	Q0	q1

The set accepted by the above finite automaton is

a) the set of all strings not containing two consecutive 0's
b) the set of all strings containing two consecutive 0's
c) the set of all strings not containing a 0
d) the set of all strings containing a 1

Q104. Consider the finite automaton given below

	0	1
-→q0	φ	q1
q1	Q0	q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q105. Consider the finite automaton given below

	0	1
-→q0	φ	q1
Q1	Q0	q1

Let M1 be the machine obtained by interchanging the final and nonfinal states of the above automaton. The set accepted by M1 is

a) the set of all strings containing two consecutive 0's
b) the set of all strings no containing two consecutive 0's
c) the set (0+1)*
d) the set of all strings not containing a 1

Q106. Consider the finite automaton given below

	0	1
--→*q0	q00	q1
*q1	q0	q1
*q00	φ	q1

The minimal finite automata corresponding to the above automaton has

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

Q107. Consider the finite automaton given below

	0	1
--→*q0	q00	q1
*q1	q0	q1
*q00	φ	q1

The regular expression denoting the set accepted by the above finite automaton is

a) complement of (0+1)*000(0+1)*
b) (0+1)*000(0+1)*
c) (0+1)*
d) (0+1)+

Q108. Consider the finite automaton given below

	0	1
--→*q0	q00	q1
*q1	q0	q1
*q00	φ	q1

The set accepted by the above finite automaton is best described as

a) the set of all strings over {0,1} not containing three consecutive 0's
b) the set of all strings over {0,1} containing three consecutive 0's
c) the set of all strings over {0,1}
d) the set of all strings over {0,1} not containing two consecutive 1's

Q109. Consider the finite automaton given below

	0	1
--→*q0	q00	q1
*q1	q0	q1
*q00	φ	q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q110. Consider the finite automaton given below

	0	1
--→*q0	q00	q1
*q1	q0	q1
*q00	φ	q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 that are accepted by a machine M obtained by interchanging the final and nonfinal states of the finite automaton given above. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q111. Consider the finite automaton given below

	0	1
->qs	φ	q1
*q0	q0	q1
q1	q2	q3
q2	q4	q0
q3	q1	q2
q4	q3	q4

The set accepted by the above finite automaton can be described as

a) the set of all strings over {0,1} that starting with a 1 and interpreted as the binary representation of an integer are congruent to 0 modulo 5.
b) The set of all strings over {0,1}
c) The set of all strings over {0,1} that interpreted as the binary representation of an integer are congruent to 0 modulo 5
d) The set of all strings over {0,1}not containing a 0

Q112. Consider the finite automaton given below

	0	1
->qs	φ	q1
*q0	q0	q1
q1	q2	q3
q2	q4	q0
q3	q1	q2
q4	q3	q4

The minimal finite automaton corresponding to the above machine has

a) 7 states
b) 6 states
c) 5 states
d) 8 states

Q113. Consider the finite automaton given below

	0	1
->qs	φ	q1

*q0	q0	q1
Q1	q2	q3
Q2	q4	q0
Q3	q1	q2
Q4	q3	q4

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 that are accepted by a machine M obtained by interchanging the final and nonfinal states of the finite automaton given above. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q114. Consider the finite automaton given below

	0	1
->qs	φ	q1
*q0	q0	q1
Q1	q2	q3
Q2	q4	q0
Q3	q1	q2
Q4	q3	q4

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q115. Consider the finite automaton given below

	0	1
->Q0	Q0	Q1
Q1	Q0	Q11
Q11	Q0	Q111
*q111	Q111	Q111

The minimal finite automat corresponding to the above automaton has
a) 3 states b)4 states c) 5 states d) none of the above

Q116. Consider the finite automaton given below

	0	1
->Q0	Q0	Q1
Q1	Q0	Q11
Q11	Q0	Q111
*q111	Q111	Q111

The regular expression denoting the set accepted by the above finite automaton is

a) (0+1)*111
b) (0+1)*111(0+1)*
c) complement of (0+1)*111(0+1)*
d) complement of (0+1)*111

Q117. Consider the finite automaton given below

	0	1
->Q0	Q0	Q1
Q1	Q0	Q11
Q11	Q0	Q111
*q111	Q111	Q111

The set accepted by the above automaton is, over the alphabet {0,1}

a) the set of all strings containing three consecutive 1's
b) the set of all strings not containing three consecutive 1's
c) the set of all strings containing three consecutive 0's
d) the set of all strings ending in three consecutive 1's

Q118. Consider the finite automaton given below

	0	1
->Q0	Q0	Q1
Q1	Q0	Q11
Q11	Q0	Q111
*q111	Q111	Q111

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q119. Consider the finite automaton given below

	0	1
->Q0	Q0	Q1
Q1	Q0	Q11
Q11	Q0	Q111
*q111	Q111	Q111

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and nonfinal states in the above automaton. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q120. Consider the finite automaton given below

	0	1
->Qs	Qs	Q1
Q1	Qs	φ
Q0	φ	Qs

The set accepted by the finite automata over the alphabet {0,1} can be described as

a) the set of all strings over {0,1}
b) the set of all strings over {0,1} where every prefix does not have one more 0 then 1's nor one more 1 than 0's.
c) the set of all strings over {0,1} where every prefix has one more 1 than 0's or one more 0 than 1's
d) none of the above

Q121. Consider the finite automaton given below

	0	1
->Qs	Qs	Q1
Q1	Qs	φ
Q0	φ	Qs

The regular expression denoting the set accepted by the above automaton is

a) (01+10)*
b) (0+1)*
c) (00+11)*
d) none of the above

Q122. Consider the finite automaton given below

	0	1
->Qs	Qs	Q1
Q1	Qs	φ
Q0	φ	Qs

The minimal finite automata corresponding to the above machine has

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

Q123. Consider the finite automaton given below

	0	1
->Qs	Qs	Q1
Q1	Qs	φ
Q0	φ	Qs

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and nonfinal states in the above automaton. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q124. Consider the finite automaton given below

	0	1
->Qs	Qs	Q1
Q1	Qs	φ
Q0	φ	Qs

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q125. Consider the finite automaton given below

	0	1
->*Qs	Qs	Q1
*q1	Qs	Q11
*Q11	Q11,0	Q11
*Q11,0	φ	Q11

The set accepted by the above automaton can be best described as

a) the set of all strings over {0,1} where every pair of consecutive 0's occurs before any pair of adjacent 1's
b) the set of all strings over {0,1} where every pair of adjacent 1's occurs before any pair of adjacent 0's
c) the set of all strings over {0,s}
d) none of the above

Q126. Consider the finite automaton given below

	0	1
->*Qs	Qs	Q1
*q1	Qs	Q11
*Q11	Q11,0	Q11
*Q11,0	φ	Q11

The minimal finite automata corresponding to the above automaton has

a) 4 states b) 5 states c) 6 states d) none of the above

Q127. Consider the finite automaton given below

	0	1
->*Qs	Qs	Q1
*q1	Qs	Q11
*Q11	Q11,0	Q11
*Q11,0	φ	Q11

The minimal finite auotmata accepting the complement of the language accepted by the above finite auotomaton has

a) 3 states b)4 states c) 5 states d) none of the above

Q128. Consider the finite automaton given below

	0	1
->*Qs	Qs	Q1
*q1	Qs	Q11
*Q11	Q11,0	Q11
*Q11,0	φ	Q11

The regular expression denoting the set accepted by the above automaton can be best described as

a) (01+0)*(1+10)*
b) (10+0)*(0+10)*
c) (0+1)*
d) none of the above

Q129. Consider the finite automaton given below

	0	1
->*Qs	Qs	Q1
*q1	Qs	Q11
*Q11	Q11,0	Q11
*Q11,0	φ	Q11

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q130. Consider the finite automaton given below

	0	1
->*A	A	A,B
B	C	C
C	D	D
*D	φ	φ

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q131. Consider the finite automaton given below

	0	1
->*A	A	A,B
B	C	C
C	D	D
*D	φ	φ

Let the above machine M accept the language L. Consider the machine M1 obtained by interchanging the final and non-final states of the above machine and accepting the language L1. Which of the following is correct?

a) L1 is a subset of L
b) L1=L
c) L1 is the complement of L
d) L1=(0+1)*

Q132. Consider the finite automaton given below

	0	1
->*A	A	A,B
B	C	C
C	D	D
*D	φ	φ

The minimal dfa for the above automaton has

a) 6 states
b) 7 states
c) 8 states
d) 10 states

Q133. Consider the finite automaton given below

	0	1
->*A	A	A,B
B	C	C
C	D	D
*D	φ	φ

The language accepted by the above machine is best described as

a) the set of all strings over {0,1} where the third symbol from the right end is a 1
b) the set of all strings over {0,1} where the third symbol from the right end is a 0
c) the set of all strings over {0,1}*
d) the set of all strings with an even number of 0's

Q134.Consider the finite automaton given below

	0	1
->Qs	Q0	Qs
Q0	Q00	Qs
*Q00	Q00	Qs

The minimal finite automata corresponding to the above automaton has
a) 3 states b)4 states c)5 states d) none of the above

Q135.Consider the finite automaton given below

	0	1
->Qs	Q0	Qs
Q0	Q00	Qs
*Q00	Q00	Qs

The minimal finite automata accepting the complement of the set accepted by the above automaton has
a) 3 state b) 4 states c) 5 states d) none of the above

Q136.Consider the finite automaton given below

	0	1
->*Qs	Q0	Qs
Q0	Q00	Qs
*Q00	Q00	Qs

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q137.Consider the finite automaton given below

	0	1
->Qs	Q0	Qs
Q0	Q00	Qs
*Q00	Q00	Qs

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and nonfinal states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q138.Consider the finite automaton given below

	0	1
->Qs	Q0	Qs
Q0	Q00	Qs

*Q00	Q00	Qs

The language accepted by the above automaton can be described as

a) the set of all strings over {0,1} ending in 00
b) the set of all strings over {0,1}
c) the set of all strings ending with a 0
d) the set of all strings over {0,1} ending with a 1

Q139. Consider the finite automaton given below

	0	1
->Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q1
*Q11	Q0	Q11

The set accepted by the finite automata can be described as

a) the set of all strings over {0,1} ending in 00 or 11
b) the set of all strings over {0,1} not ending in 00 or 11
c) the set of all strings over {0,1}
d) none of the above

Q140. Consider the finite automaton given below

	0	1
->Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q1
*Q11	Q0	Q11

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and nonfinal states in the above machine. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q141. Consider the finite automaton given below

	0	1
->Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q1
*Q11	Q0	Q11

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q142. Consider the finite automaton given below

	0	1
->Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q1
*Q11	Q0	Q11

The minimal finite automata corresponding to the above machine has

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

Q143. Consider the finite automaton given below

	0	1
->*Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q00
*Q11	Q11	Q11

The language accepted by the above finite automaton can be described as

a) the set of all strings containing 00 or 11 as a substring
b) the of all strings over {0,1} ending in 00 or 11
c) the set of all strings over {0,1}
d) none of the above

Q144. Consider the finite automaton given below

	0	1
->*Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q00
*Q11	Q11	Q11

The minimal finite automata accepting the same language as the above machine has

a) 3 states

b) 5 states
c) 6 states
d) none of the above

Q145. Consider the finite automaton given below

	0	1
->*Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q00
*Q11	Q11	Q11

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q146. Consider the finite automaton given below

	0	1
->*Qs	Q0	Q1
Q0	Q00	Q1
Q1	Q0	Q11
*Q00	Q00	Q00
*Q11	Q11	Q11

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q147. Consider the finite automaton given below

	0	1
->*Q00	Q10	Q01
Q10	Q00	Q11
Q01	Q11	Q00
Q11	Q01	Q10

The minimal finite automata accepting the same language as the machine above has
a) 4 states
b) 5 states
c) 3 states
d) 6 states

Q148. Consider the finite automaton given below

	0	1
->*Q00	Q10	Q01
Q10	Q00	Q11
Q01	Q11	Q00
Q11	Q01	Q10

The set accepted by the above automaton can be denoted by the regular expression
a)(0+1)*
b)(00+11)*
c)(00+11+(01+10)(00+11)*(01+10))*
d)none of the above

Q149. Consider the finite automaton given below

	0	1
->*Q00	Q10	Q01
Q10	Q00	Q11
Q01	Q11	Q00
Q11	Q01	Q10

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q150. Consider the finite automaton given below

	0	1
->*Q00	Q10	Q01
Q10	Q00	Q11
Q01	Q11	Q00
Q11	Q01	Q10

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q151. Consider the finite automaton given below

	0	1
->*A	A	B
*B	C	B
C	C	C

The set accepted by the above automaton can be best described as
a) (0+1)*

b) 0*1*
c) 0*1+
d) (0*11*)*

Q152. Consider the finite automaton given below

	0	1
->*A	A	B
*B	C	B
C	C	C

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q153. Consider the finite automaton given below

	0	1
->*A	A	B
*B	C	B
C	C	C

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q154. Consider the finite automaton given below

	0	1
->*A	A	B
*B	C	B
C	C	C

The minimal finite automata corresponding to the above automaton has

a) 3 states
b) 4 states
c) 5 states
d) none of the above

Q155. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Qs	Q1

The languages accepted by the above automaton can be best described as

a) one or more repetititons of the string: the set of all strings ending in 101

b) one or more repetititons of the string: the set of all strings ending in 101 and having only one occurrence of 101
c) the set of all strings over {0,1}
d) none of the above

Q156. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Qs	Q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q157. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Qs	Q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q158. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Qs	Q1

The minimal finite automata corresponding to the above automaton has
a) 3 states
b) 4 states
c) 5 states
d) 6 states

Q159. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Q10	Q1

The set accepted by the above automata can be described as

a) the set of all strings over {0,1} ending in 101
b) the set of all strings over {0,1} not ending in 101
c) the set of all strings over {0,1}
d) none of the above

Q160. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Q10	Q1

The minimal finite automata corresponding to the above machine has

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

Q161. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Q10	Q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q162. Consider the finite automata given below

	0	1
->Qs	Qs	Q1
Q1	Q10	Q1
Q10	Qs	Q101
*Q101	Q10	Q1

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q163. Consider the nfa M given below

	0	1
->A	B,D	D

*B	------	-----
C	C	C,D
D	C,D	A,D

Let L be the language accepted by M. Let L1 be the language accepted by M1 where M1 is obtained from M by interchanging the final and non-final states of M
Choose the correct answer

a) L1 is the complement of L
b) L1 is a subset of L
c) L1=L
d) L1=(0+1)*

Q164. Consider the nfa below

	0	1
->A	B,C	D
B	A,B	B,C
*C	C	C
*D	D	D

Let L be the language accepted by M. Let L1 be the language accepted by M1 where M1 is obtained from M by interchanging the final and non-final states of M
Choose the correct answer

e) L1 is the complement of L
f) L1 is a subset of L
g) L1=L
h) L1=(0+1)*

Q165. Consider the nfa given below

	0	1
->A	A	A,B
B	C	C
C	D	D
*D	------	------

Let L be the language accepted by M. Let L1 be the language accepted by M1 where M1 is obtained from M by interchanging the final and non-final states of M
Choose the correct answer

i) L1 is the complement of L
j) L1 is a subset of L
k) L1=L
l) L1=(0+1)*

Q166. Consider the nfa given below

	0	1
->A	A,B	A,D
B	C	----
*C	----------	------
D	---------------	E
*E	-----------	-----

Let L be the language accepted by M. Let L1 be the language accepted by M1 where M1 is obtained from M by interchanging the final and non-final states of M
Choose the correct answer

m) L1 is the complement of L
n) L1 is a subset of L
o) L1=L
p) L1=(0+1)*

Q167. Consider the nfa given below

	0	1
->A	A,B	A
B	C	----------
C	D	-----------
*D	-------------	---------------

Let L be the language accepted by M. Let L1 be the language accepted by M1 where M1 is obtained from M by interchanging the final and non-final states of M
Choose the correct answer

q) L1 is the complement of L
r) L1 is a subset of L
s) L1=L
t) L1=(0+1)*

Q168. Consider the nfa given below

	0	1
->A	A,B	A
B	C	----
*C	-------	-----

Let L be the language accepted by M. Let L1 be the language accepted by M1 where M1 is obtained from M by interchanging the final and non-final states of M
Choose the correct answer

u) L1 is the complement of L
v) L1 is a subset of L
w) L1=L
x) L1=(0+1)*

Q169. Consider the nfa M given below

	0	1
->A	B,D	D
*B	------	-----
C	C	C,D
D	C,D	A,D

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q170. Consider the nfa M given below

	0	1
->A	B,D	D
*B	------	-----
C	C	C,D
D	C,D	A,D

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q171. Consider the nfa below

	0	1
->A	B,C	D
B	A,B	B,C
*C	C	C
*D	D	D

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q172. Consider the nfa below

	0	1
->A	B,C	D
B	A,B	B,C
*C	C	C
*D	D	D

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

173. Consider the nfa given below

	0	1
->A	A	A,B
B	C	C
C	D	D
*D	------	------

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

174. Consider the nfa given below

	0	1

->A	A	A,B
B	C	C
C	D	D
*D	------	------

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q175. Consider the nfa given below

	0	1
->A	A,B	A,D
B	C	----
*C	----------	------
D	---------------	E
*E	-----------	-----

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q176. Consider the nfa given below

	0	1
->A	A,B	A,D
B	C	----
*C	----------	------
D	---------------	E
*E	-----------	-----

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M.The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q177. Consider the nfa given below

	0	1
->A	A,B	A
B	C	----------
C	D	-----------
*D	-------------	---------------

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q178. Consider the nfa given below

	0	1
->A	A,B	A
B	C	----------
C	D	-----------
*D	-------------	---------------

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q179. Consider the nfa given below

	0	1
->A	A,B	A
B	C	----
*C	-------	-----

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states in the above machine. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q180. Consider the nfa given below

	0	1
->A	A,B	A
B	C	----
*C	-------	-----

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q181. Consider the 2DFA given below

	0	1
->*Q0	(Q1,R)	(Q1,L)
*Q1	(Q0,R)	(Q0,L)

Choose the correct statement

a) the machine accepts all strings ending with a 1
b) the machine accepts 0*
c) the machine accepts 01
d) the machine accepts 001

Q182. Consider the 2DFA given below

	0	1
->*Q0	(Q1,R)	(Q1,L)
*Q1	(Q0,R)	(Q0,L)

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q183. Consider the 2DFA given below

	0	1
->*Q0	(Q1,R)	(Q1,L)
*Q1	(Q0,R)	(Q0,L)

Choose the false statement

a) the machine loops on 01
b) the machine does not accept 0000
c) the machine accepts strings ending with a 1
d) the machine accepts strings ending with 10

Q184. Consider the 2DFA given below

	0	1
->*Q0	(Q0,R)	(Q1,R)
*Q1	(Q0,L)	(Q2,L)
*Q2	(Q1,L)	(Q1,L)

Choose the correct statement

e) the machine accepts all strings ending with a 1
f) the machine accepts 0*
g) the machine accepts 01
h) the machine accepts 001

Q185. Consider the 2DFA given below

	0	1
->*Q0	(Q0,R)	(Q1,R)
*Q1	(Q0,L)	(Q2,L)
*Q2	(Q1,L)	(Q1,L)

Choose the false statement

e) the machine loops on 01
f) the machine does not accept 0000
g) the machine accepts strings ending with a 1
h) the machine accepts strings ending with 10

Q186. Consider the 2DFA given below

	0	1
->*Q0	(Q0,R)	(Q1,R)
*Q1	(Q0,L)	(Q2,L)
*Q2	(Q1,L)	(Q1,L)

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q187. Consider the 2NFA given below

	0	1
->*Q0	{(Q0,R)}	{(q0,L),(q1,R)}
*Q1	{(Q1,L)}	{(Q1,L)}

Choose the correct statement

i) the machine accepts all strings ending with a 1
j) the machine accepts 0*
k) the machine accepts 01
l) the machine accepts 001

Q189. Consider the 2NFA given below

	0	1
->*Q0	{(Q0,R)}	{(q0,L),(q1,R)}
*Q1	{(Q1,L)}	{(Q1,L)}

Choose the false statement

i) the machine loops on 01
j) the machine does not accept 0000
k) the machine accepts strings ending with a 1
l) the machine accepts strings ending with 10

Q190. Consider the 2NFA given below

	0	1
->*Q0	{(Q0,R)}	{(q0,L),(q1,R)}
*Q1	{(Q1,L)}	{(Q1,L)}

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is
(a) 1 (b) 4 (c) 7 (d) none of the above

Q191. Consider the turing machine M defined below

	0	1	B
->Q0	(Q0,0,R)	(Q2,1,L)	(Qf,-,-)
Q1	(Q2,1,L)	(Q1,1,R)	(Qf,-,-)
Q2	(Q2,1,L)	(Q2,0,L)	(Qf,-,-)
*Qf	---------	-------------	-----------

Choose the correct statement

m) the machine accepts all strings ending with a 1
n) the machine accepts 0*
o) the machine accepts 01
p) the machine accepts 001

Q192. Consider the turing machine M defined below

	0	1	B
->Q0	(Q0,0,R)	(Q2,1,L)	(Qf,-,-)
Q1	(Q2,1,L)	(Q1,1,R)	(Qf,-,-)
Q2	(Q2,1,L)	(Q2,0,L)	(Qf,-,-)
*Qf	---------	-------------	-----------

Choose the false statement

m) the machine loops on 01
n) the machine does not accept 0000
o) the machine accepts strings ending with a 1

the machine accepts strings ending with 10

Q193. Consider the turing machine M defined below

	0	1	B
->Q0	(Q0,0,R)	(Q2,1,L)	(Qf,-,-)

Q1	(Q2,1,L)	(Q1,1,R)	(Qf,-,-)
Q2	(Q2,1,L)	(Q2,0,L)	(Qf,-,-)
*Qf	---------	-------------	-----------

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q194. Consider the turing machine M given below

	@	0	1	$
->Q0	{(Q0,@,R)}	{(Q0,0,R),(Q1,0,R)}	{(Q0,1,r),(Q1,1,r)}	{(Q2,$,L)}
Q1	{(Q0,@,R)}	{(Q0,0,R),(Q1,0,R)}	{(Q0,1,r),(Q1,1,r)}	{(Q2,$,L)}
Q2	HALT	{(Q2,1,L)}	{(q2,0,L)}	----

Choose the correct statement

a) the machine is guaranteed to halt on all inputs
b) there exists an input for which it halts
c) it is undecidable if the above machine will halt
d) the machine does not accept a context-sensitive language

Q195. Consider the turing machine M given below

	@	0	1	$
->Q0	{(Q0,@,R)}	{(Q0,0,R),(Q1,0,R)}	{(Q0,1,r),(Q1,1,r)}	{(Q2,$,L)}
Q1	{(Q0,@,R)}	{(Q0,0,R),(Q1,0,R)}	{(Q0,1,r),(Q1,1,r)}	{(Q2,$,L)}
Q2	HALT	{(Q2,1,L)}	{(q2,0,L)}	----

Choose the correct statement

a) the machine complements the input over {0,1}and halts
b) the machine does not halt
c) the machine leaves the input unchanged
d) none of the above

Q196. Consider the fa M given below

	0	1
->*A	A	B
B	C	B
C	A	B

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q197. Consider the fa M given below

	0	1
->*A	A	B
B	C	B
C	A	B

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q198. Consider the fa M given below

	0	1
->*A	A	B
B	C	B
C	A	B

The minimal finite automata accepting the same language as M has

a) 3 states b)4 states c) 5 states d) none of the above

Q199. Consider the dfa given below

	0	1
->A	B	C
*B	A	C
*C	B	A

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q200. Consider the dfa given below

	0	1
->A	B	C
*B	A	C
*C	B	A

Let S denote the set of all six bit binary strings in which the first and the fourth bits are 1 in the machine M obtained by interchanging the final and non-final states. The number of strings in S that are accepted by M is

(a) 1 (b) 4 (c) 7 (d) none of the above

Q201. Consider the dfa given below

	0	1
->A	B	C
*B	A	C
*C	B	A

The minimal finite automata accepting the same language as M has

a) 3 states b)4 states c) 5 states d) none of the above

Q202. The language accepted by a pushdown automata whose stack is limited to 10 items is best described as

A. Context free
B. Regular
C. Deterministic Context Free
D. Recursive

[GATE 2001]

Q203. The language accepted by a deterministic pushdown automata whose stack is limited to 10 items is best described as

E. Context free
F. Regular
G. Deterministic Context Free

H. Recursive

Q204. The language accepted by a two pushdown tape automata whose stacks are limited to 10^1000 items is best described as

I. Context free
J. Regular
K. Deterministic Context Free
L. Recursive

Q205. The language accepted by a 1000 pushdown automata whose stacks are limited to 123456789 items is best described as

M. Context free
N. Regular
O. Deterministic Context Free
P. Recursive

Q207. The language accepted by a pushdown automata whose input is limited to 10 items is best described as

Q. Context free
R. Regular
S. Deterministic Context Free
T. Recursive

Q209. The language accepted by a turing machine whose input tape is limited to 10 squares with a finite input and finite tape alphabet is best described as

U. Context free
V. Regular
W. Deterministic Context Free
X. Recursive

Q210. The language accepted by a multitape, multiheaded, multitrack nondeterministic turing machine whose input tape is limited to 10 cells and whose input and tape alphabet is finite is best described as

Y. Context free
Z. Regular
AA. Deterministic Context Free
BB. Recursive

Q211. The language accepted by a pushdown automata which never uses its stack is best described as

CC. Context free
DD. Regular
EE. Deterministic Context Free
FF. Recursive

Q212. The language accepted by a turing machine whose ink dries up after printing 1000 symbols is best described as

GG. Context free
HH. Regular
II. Deterministic Context Free

JJ. Recursive

Q213. The language accepted by a multiheaded, multitape, multidimensional, nondeterministic turing machine whose ink has dried up after 1,000,000 symbols printed is best described as

KK. Context free

LL. Regular

MM. Deterministic Context Free

NN. Recursive

Q214. The language accepted by a linear bounded automata whose ink dries up after 100000000000 symbols printed is best described as

OO. Context free

PP. Regular

QQ. Deterministic Context Free

RR. Recursive

Q215. The language accepted by a deterministic linear bounded auotmata whose input tape is limited to 10000000000000000000000000000 cells is best described as

SS. Context free

TT. Regular

UU. Deterministic Context Free

VV. Recursive

Q216. The language accepted by a finte automata with 100000000000000000 states as the upper limit is best described as

WW. Context free

XX. Regular

YY. Deterministic Context Free

ZZ. Recusive

Q217. The C language is

a. A context free language
b. A context sensitive language
c. A regular language
d. Parsable fully only by Turing machines

[GATE 2002]

Q218. The Java language is

e. A context free language
f. A context sensitive language
g. A regular language
h. Parsable fully only by Turing machines

Q219. The C++ language is

i. A context free language
j. A context sensitive language

k. A regular language
l. Parsable fully only by Turing machines

Q220. Machine language for the random access computer is
m. A context free language
n. A context sensitive language
o. A regular language
p. Parsable fully only by Turing machines

Q221. Assembly language is
q. A context free language
r. A context sensitive language
s. A regular language
t. Parsable fully only by Turing machines

Q222. To evaluate an expression without any embedded function calls
a. one stack is enough
b. two stacks are needed
c. as many stacks as the height of the expression tree are needed
d. a Turing machine is needed in the general case

[GATE 2002]

Q223. The smallest finite automaton which accepts the language {|x| length of x is divisble by 3} has
a. 2 states
b. 3 states
c. 4 states
d. 5 states

[GATE 2002]

Q224. The smallest finite automaton which accepts the language {|x| length of x is divisble by 30} has
e. 20 states
f. 30 states
g. 40 states
h. 50 states

Q225. The smallest finite automaton which accepts the language {|x| length of x is divisble by 500} has
i. 200 states
j. 300 states
k. 400 states
l. 500 states

Q226. Which of the following is true?
a. The complement of a recursive language is recursive

b. The complement of a recursively enumerable language is recursively enumerable
c. The complement of a recursive language is either recursive or recursively enumerable
d. The complement of a context-free language is context-free

[GATE 2002]

Q227. Given that L is a recursively enumerable language which is not recursive and L1 is its complement which of the following statements about L1 is true?

a. L1 is necessarily recursive
b. L1 is necessarily recursively enumerable
c. L1 is either recursive or recursively enumerable
d. L1 is not recursively enumerable

Q228. Consider the nfa below

	a	b
->A	A,B	A
B	-----	C
C	---	D
*D	---	---

Which of the following statements about the machine above is true?

a. the language accepted is (a|b)*abb
b. the language accepted is (a+b)*
c. the language accepted is (a+b)+
d. the language accepted is (a|b)*aab

[GATE 2002 MODIFIED]

Q229. The minimal dfa for the language (a|b)*abb has
a) 3 states b)4 states c)5 states d) none of the above

[GATE 2002 MODIFIED]

Q230. Consider the dfa below

	a	B
->Qs	Qa	Qs
Qa	Qa	Qab
Qab	Qa	Qabb
*Qabb	Qa	Qs

The minimal dfa for the above machine has
a) 3 states b)4 states c)5 states d) none of the above

[GATE 2002 MODIFIED]

Q230. Let L be a language accepted by some turing machine and L1 its complement also accepted by a turing machine then choose the correct statement

a) L is recursively enumerable but not necessarily recursive
b) L is recursive but L1 is not necessarily recursive
c) Both L and L1 are recursively enumerable but not necessarily recursive
d) Both L and L1 are recursive

Q231. Let L be a language accepted by some nondeterministic multitape turing machine and L1 its complement also accepted by a two pushdown tape machine then choose the correct statement

e) L is recursively enumerable but not necessarily recursive
f) L is recursive but L1 is not necessarily recursive
g) Both L and L1 are recursively enumerable but not necessarily recursive
h) Both L and L1 are recursive

Q232. Let L be a language accepted by some nondeterministic multitape turing machine and L1 its complement also accepted by a nondeterministic two pushdown tape machine then choose the correct statement

i) L is recursively enumerable but not necessarily recursive
j) L is recursive but L1 is not necessarily recursive
k) Both L and L1 are recursively enumerable but not necessarily recursive
l) Both L and L1 are recursive

Q233. Choose the correct statement

a) there exists a universal turing machine which can simulate any turing machine M on its input w
b) there does not exist a universal turing machine which can simulate any turing machine on its input w
c) the set Ld={<Mi,wi>| the encoding Mi of the ith turing machine does not accept the input wi, in an enumeration of turing machines and input strings} is recursively enumerable
d) the universal language is recursive

Q234. The printing problem of turing machines is whether a turing machine ever prints a 1 on its tape. Ram takes the set L={<M,w>| encoding of turing machine M that does not accept w} which is known to be undecidable. He modifies M such that in an accepting state no moves are made. Shyam further modifes M to M1 so that in an accepting state it prints a 1 and then halts. Choose the correct statement.

a) We can conclude that M1 prints a 1 and halts only if M accepts w, and thus the printing problem reduces to the problem of L being recursive
b) We cannot conclude that the printing problem is undecidable
c) We can conclude that the printing problem is recursive but not necessarily recursively enumerable
d) None of the above.

Q235. The state problem of turing machines is whether a turing machine ever enters a state q. Ram takes the set L={<M,w>| encoding of turing machine M that does not accept w} which is known to be undecidable. He modifies M such that in an accepting state no moves are made. Shyam further modifes M to M1 so that in an accepting state it moves to state q and then halts. Choose the correct statement.

e) We can conclude that M1 halts only if M accepts w, and thus the state problem reduces to the problem of L being recursive
f) We cannot conclude that the printing problem is undecidable
g) We can conclude that the printing problem is recursive but not necessarily recursively enumerable
h) None of the above.

Q236. The printing problem of turing machines is whether a turing machine ever prints a 111 on its tape. Ram takes the set L={<M,w>| encoding of turing machine M that does not accept w} which is known to be undecidable. He modifies M such that in an accepting state no moves are made. Shyam further modifes M to M1 so that in an accepting state it prints a 111 and then halts. Choose the correct statement.

i) We can conclude that M1 prints a 111 and halts only if M accepts w, and thus the printing problem reduces to the problem of L being recursive
j) We cannot conclude that the printing problem is undecidable
k) We can conclude that the printing problem is recursive but not necessarily recursively enumerable
l) None of the above.

Q237. The blank tape halting of turing machines is whether a turing machine started on blank tape halts. Ram takes the set L={<M,w>| encoding of turing machine M that does not accept w} which is known to be undecidable. He modifies M such that in an accepting state no moves are made. Shyam further modifes M to M1 so that it starts with a blank tape and first prints w on the tape and behaves just like M. Choose the correct statement.

m) We can conclude that M1 halts only if M accepts w, and thus the printing problem reduces to the problem of L being recursive
n) We cannot conclude that the printing problem is undecidable
o) We can conclude that the printing problem is recursive but not necessarily recursively enumerable
p) None of the above.

Q238. The aim of the following questionis to prove that the language {M| M is the code of a turing machine which, irrespective of the input, halts and outputs a 1, is undecidable. This is to be done by reducing from the language {M',x|M' halts on x}, which is known to be undecidable.

Ram proceeds as follows. He takes the turing machine M and modifies it so that it makes no moves in its final state and then it prints a 1 in the final state and halts. Shyam further modifies this M so that it initially takes an arbitrary turing machine M' and its input x, and if M' accepts and halts on x then M will start its operation otherwise not. This he achieves by having M enumerate turing machines and strings till the encoding for M' and x are obtained.

Choose the correct statement

a) the modified M will accept all strings and print a 1 provided M halts on w, but we have a decision problem for M' then we can resolve whether M halts on w
b) M' is always recursive and the modified M accepts a recursive language
c) The above argument shows that M' is recursively enumerable
d) The above argument shows that M' is recursive but not necessarily context sensitive

Q239. The emptiness problem for r.e. sets is whether for any r.e. set L we can decide if L=φ. As L is a subset of {a} we conclude that

a) L does not satisfy the containment property so L cannot be r.e.
b) L is a regular set as {a} is regular
c) L is recursive always
d) L is recursively enumerable

Q240. The completeness problem for r.e. sets is whether for any r.e. set L we can decide if L=Σ*.

a) as no finite subset of L can be the same as L we conclude that the set L is not r.e.
b) L is r.e. as L is regular
c) L is recursively enumerable as we only require a turing machine that halts on all inputs
d) L is recursive but not necessarily context-free

Q241. The regularity problem for r.e. sets is whether for any r.e. set L, is L regular?

a) the regularity problem is decidable
b) as the regular sets are contained in the context-free languages if the regularity problem is decidable then by the containment property every cfl must be regular
c) every r.e. set is trivially seen to be regular as every turing machine has a finite control
d) as every regular set is contained in the set of all strings, the latter must be in L by the containment property and that is known to be undecidable.

Q242. The context-freeness problem for r.e. sets is whether for any r.e. set L, is L context-free?

e) the context-freeness problem is decidable
f) as the regular sets are contained in the context-free languages if the regularity problem is decidable then by the containment property every cfl must be regular
g) every r.e. set is trivially seen to be context-free as every turing machine has a finite control
h) as every context-free language is contained in the set of all strings, the latter must be in L by the containment property and that is known to be undecidable.

Q243. The recusiveness problem for r.e. sets is whether for any r.e. set L, is L recursiver?

i) the recusiveness problem is decidable
j) as the regular sets are contained in the recursisve if the regularity problem is decidable then by the containment property every recursive set must be r.e.
k) every recursive set is trivially seen to be regular as every turing machine has a finite control

l) as every recursive set is contained in the set of all strings, the latter must be in L by the containment property and that is known to be undecidable.

Q244. Let L0={<M,0>|M is the encoding of a turing machine that accepts the empty set} And L1={<M,1>|M is the encoding of a turing machine that does not accept the empty set}.Let L=L0UL1. Let L' be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L' is recursive
b) L is recursive and L' is recursively enumerable
c) L is not recursively enumerable and L' is recursive
d) Neither L nor L' is recursively enumerable

Q245. Let L0={<M,0>|M is the encoding of a turing machine that accepts an infinite ty set}
And L1={<M,1>|M is the encoding of a turing machine that does not accept an infinite set}.Let L=L0UL1. Let L' be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L' is recursive
e) L is recursive and L' is recursively enumerable
f) L is not recursively enumerable and L' is recursive
g) Neither L nor L' is recursively enumerable

Q246. Let L0={<M,0>|M is the encoding of a turing machine that accepts a singleton set}
And L1={<M,1>|M is the encoding of a turing machine that does not accept a singleton set}.Let L=L0UL1. Let L' be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L' is recursive
h) L is recursive and L' is recursively enumerable
i) L is not recursively enumerable and L' is recursive
j) Neither L nor L' is recursively enumerable

Q247. Let L0={<M,M',0>|M,M' are the encodings of turing machines that accept the empty set}
And L1={<M,M',1>|M,M' are the encodings of a turing machines that either one or both do not accept the empty set}.Let L=L0UL1. Let L' be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L' is recursive
k) L is recursive and L' is recursively enumerable
l) L is not recursively enumerable and L' is recursive
m) Neither L nor L' is recursively enumerable

Q248. Let L0={<M,0>|M is the encoding of a turing machine that accepts a cfl}
And L1={<M,1>|M is the encoding of a turing machine that does not accept a cfl}.Let L=L0UL1. Let L' be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L' is recursive
n) L is recursive and L' is recursively enumerable
o) L is not recursively enumerable and L' is recursive
p) Neither L nor L' is recursively enumerable

Q249. Let L0={<G,G’,0>|G,G’ are the encodings of cfgs that generate the same set}
And L1={<G,G’,1>|G,G’ are the encodings of cfgs that either one or both do not generate the same set}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive

q) L is recursive and L’ is recursively enumerable
r) L is not recursively enumerable and L’ is recursive
s) Neither L nor L’ is recursively enumerable

Q250. Let L0={<G,G’,0>|G,G’ are the encodings of regular grammars that generate the same set}
And L1={<G,G’,1>|G,G’ are the encodings of regular grammars that either one or both do not generate the same set}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive

t) L is recursive and L’ is recursively enumerable
u) L is not recursively enumerable and L’ is recursive
v) Neither L nor L’ is recursively enumerable

Q251. Let L0={<G,G’,0>|G,G’ are the encodings of cfgs that generate infinte languages}
And L1={<G,G’,1>|G,G’ are the encodings of cfgs that either one or both do not generate infinite sets}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive

w) L is recursive and L’ is recursively enumerable
x) L is not recursively enumerable and L’ is recursive
y) Neither L nor L’ is recursively enumerable

Q253. Let L0={<G,G’,0>|G,G’ are the encodings of csgs that generate the same set}
And L1={<G,G’,1>|G,G’ are the encodings of csgs that either one or both do generate the same set}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive

z) L is recursive and L’ is recursively enumerable
aa) L is not recursively enumerable and L’ is recursive
bb) Neither L nor L’ is recursively enumerable

Q254. Let L0={<G,G’,0>|G,G’ are the encodings of unrestricted grammars that generate the same set}
And L1={<G,G’,1>|G,G’ are the encodings of unrestricted grammars that either one or both do generate the same set}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive

cc) L is recursive and L’ is recursively enumerable
dd) L is not recursively enumerable and L’ is recursive
ee) Neither L nor L’ is recursively enumerable

Q255. Let L0={<G,G’,0>|G,G’ are the encodings of linear bounded automata that generate the same set}
And L1={<G,G’,1>|G,G’ are the encodings of linear bounded automata that either one or both do generate the same set}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive
ff) L is recursive and L’ is recursively enumerable
gg) L is not recursively enumerable and L’ is recursive
hh) Neither L nor L’ is recursively enumerable

Q256. Let L0={<G,G’,0>|G,G’ are the encodings of unrestricted grammars such that they generate L and LR respectively with L=LR}
And L1={<G,G’,1>|G,G’ are the encodings of unrestricted grammars that generate languages L and LR with L not the same as LR respectively}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive
ii) L is recursive and L’ is recursively enumerable
jj) L is not recursively enumerable and L’ is recursive
kk) Neither L nor L’ is recursively enumerable

Q257. Let L0={<G,G’,0>|G,G’ are the encodings of C programs that produce the same output for all inputs}
And L1={<G,G’,1>|G,G’ are the encodings of C programs that do not produce the same output for all inputs}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive
ll) L is recursive and L’ is recursively enumerable
mm) L is not recursively enumerable and L’ is recursive
nn) Neither L nor L’ is recursively enumerable

Q259. Let L0={<G,G’,0>|G,G’ are the encodings of C programs that produce some output for all inputs}
And L1={<G,G’,1>|G,G’ are the encodings of C programs that do not produce some output for all inputs}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive
oo) L is recursive and L’ is recursively enumerable
pp) L is not recursively enumerable and L’ is recursive
qq) Neither L nor L’ is recursively enumerable

Q260. Let L0={<G,G’,0>|G,G’ are the encodings of C programs that loop on some input}
And L1={<G,G’,1>|G,G’ are the encodings of C programs that do not loop on some input}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L’ is recursive
rr) L is recursive and L’ is recursively enumerable

ss) L is not recursively enumerable and L’ is recursive
tt) Neither L nor L’ is recursively enumerable

Q261. Let L0={<G,G’,0>|G,G’ are the encodings of cfgs where the intersection of the langugaes generated is a cfl}
And L1={<G,G’,1>|G,G’ are the encodings of cfgs where the intersection of the languages generated is not a cfl}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L’ is recursive
uu) L is recursive and L’ is recursively enumerable
vv) L is not recursively enumerable and L’ is recursive
ww) Neither L nor L’ is recursively enumerable
Q262. Let L0={<G,G’,0>|G,G’ are the encodings of cfgs that generate regular sets}
And L1={<G,G’,1>|G,G’ are the encodings of cfs that both or either does not generate a regular set}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L’ is recursive
xx) L is recursive and L’ is recursively enumerable
yy) L is not recursively enumerable and L’ is recursive
zz) Neither L nor L’ is recursively enumerable
Q263. Let L0={<G,G’,0>|G,G’ are the encodings of cfgs such that L(G’) is contained in L(G)}
And L1={<G,G’,1>|G,G’ are the encodings of cfgs sucht that L(G’) is not contained in L(G)}. Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L’ is recursive
aaa) L is recursive and L’ is recursively enumerable
bbb) L is not recursively enumerable and L’ is recursive
ccc) Neither L nor L’ is recursively enumerable
Q264. Let L0={<G,G’,0>|G,G’ are the encodings of cfgs which generate languages whose complement is also a cfl}
And L1={<G,G’,1>|G,G’ are the encodings of C programs that generate languages whose complement is not both a cfl}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L’ is recursive
ddd) L is recursive and L’ is recursively enumerable
eee) L is not recursively enumerable and L’ is recursive
fff) Neither L nor L’ is recursively enumerable
Q265. Let L0={<G,G’,0>|G,G’ are the encodings of ambiguous cfgs}
And L1={<G,G’,1>|G,G’ are the encodings of unambiguous cfgs}.Let L=L0UL1. Let L’ be the complement of L. Choose the correct statement
a)L is recursively enumerable but not recursive and L’ is recursive
ggg) L is recursive and L’ is recursively enumerable
hhh) L is not recursively enumerable and L’ is recursive
iii) Neither L nor L’ is recursively enumerable

Q266. Let L0={<G,G’,0>|G,G’ are the encodings of inherently ambiguous cflss}

And L1={<G,G',1>|G,G' are the encodings of cfls that are not inherently ambiguous}.Let L=L0UL1. Let L' be the complement of L. Choose the correct statement

a)L is recursively enumerable but not recursive and L' is recursive

jjj) L is recursive and L' is recursively enumerable

kkk) L is not recursively enumerable and L' is recursive

lll) Neither L nor L' is recursively enumerable

Q267. Choose the false statement

a) PCP over a one symbol alphabet is decidable
b) It is undecidable if a csl is a cfl
c) It is undecidable if a turing machine accepts at least 10 inputs
d) It is undecidable if two regular grammars generate the same set