EPT-TEST-7 (TOC)

Duration: 60 minutes

No of questions: 25

Concept:PDA

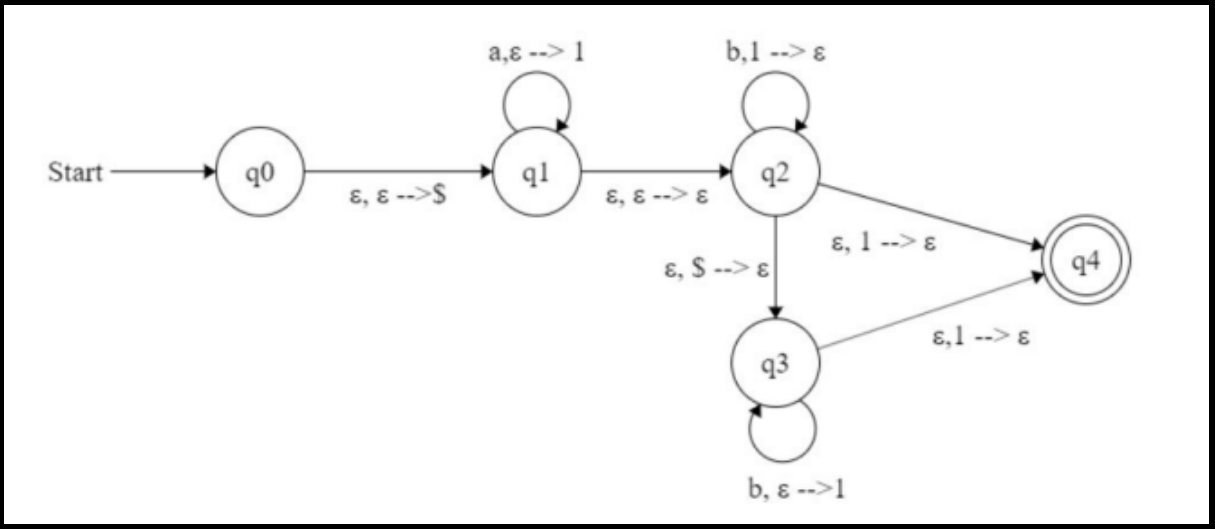
Sub-Concept:CFG

Marks: +2,-0.66

Type: MCQ

Level:moderate

Q1: Consider the following PDA:



Which of the following is the language accepted by above PDA?

A)$L=\{a^ib^j \mid i==j\}$

B)$L=\{a^ib^j \mid i\neq j\}$

C)$L=\{a^ib^j \mid i>j\}$

D)$L=\{a^ib^j \mid i<j\}$

Sub-Concept:TOC

Marks: +2

Type: MSQ

Level:moderate

Q2:Which of the following is/are true?

A)Every irregular language is infinite

B)The language $(0 + 1(01^*0)^*1)^*$ is context-free.

C)Every Finite language is regular

D)Every subset of a regular language is regular

Sub-Concept:TOC

Marks: +2,-0.66

Type: MCQ

Level:moderate

Q3:Consider the following Statements:

S-1:The language $\{0^a1^b \mid a + b$ is divisible by 374$\}$ is regular

S-2:For every language L, if for every string $w \in L$

there is a DFA that accepts w, then L is regular.

A)only S-2 is true

B)Both S-1 and S-2 are false

C)only S-1 is true.

D)Both S-1 and S-2 are true

Concept:NFA/DFA

Sub-Concept:NFA/DFA

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q4:Consider the following Statements:

S-1:If language L is accepted by an NFA with n states, then its complement Σ^*- L is also accepted by an NFA with n states

S-2: We can have every regular language accepted by a DFA with an odd number of accepting states.

A)only S-2 is true

B)Both S-1 and S-2 are false

C)only S-1 is true.

D)Both S-1 and S-2 are true

Topic:TOC

Concept:CFG/DFA

Sub-Concept:CFG/DFA

Marks: +2

Type: MSQ

Level:Difficult

Q5:Let L be the set of all strings in $\{0, 1\}^*$ in which every run of 0's is followed immediately by a longer run of 1's.

A)L is regular

B)L is not regular

C)L is CFL

D)L is not CFL

Concept:Languages

Sub-Concept:Languages

Marks: +1

Type: MSQ

Level:Easy

Q6:Which of the following are languages over the alphabet {a, b}

A) {a}

B) {b, a}

C) ab

D) empty set

Concept:NFA/DFA

Sub-Concept:NFA/DFA

Marks: +1

Type: MSQ

Level:moderate

Q7:Which of the following is/are not true?

A)Every infinite language is regular

B)Every subset of an irregular language is irregular

C)The language $\{0^a1^b \mid a\text{-}b \text{ is divisible by } 384\}$ is regular.

D)If there is a DFA that rejects every string in language L, then L is regular

Topic:TOC

Concept:NFA/DFA

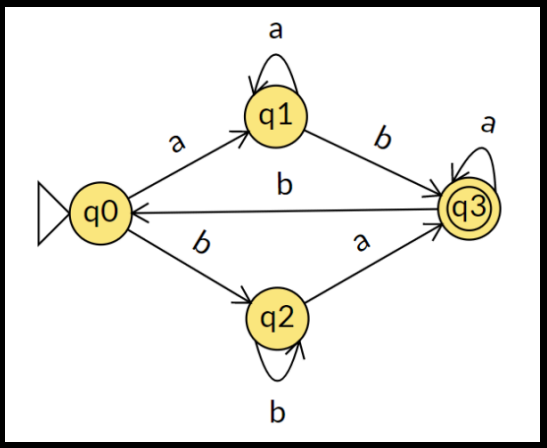
Sub-Concept:NFA/DFA

Marks: +1

Type: MSQ

Level:Easy

Q8:Which of the following strings does this DFA accept?



A)baba

B)baa

C)bababa

D)abb

Topic:TOC

Concept:CFG/DFA

Sub-Concept:CFG/DFA

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q9:Consider the following Statements:

S-1:If language L is accepted by an DFA with n states, then its complement Σ^*-L is also accepted by a DFA with n states.

S-2:The context-free grammar $S \rightarrow \epsilon \mid 0S1S \mid 1S0S$ generates all strings in which the number of 0s equals the number of 1s.

A)only S-2 is true

B)Both S-1 and S-2 are false

C)only S-1 is true.

D)Both S-1 and S-2 are true

Topic:TOC

Concept:NFA/DFA

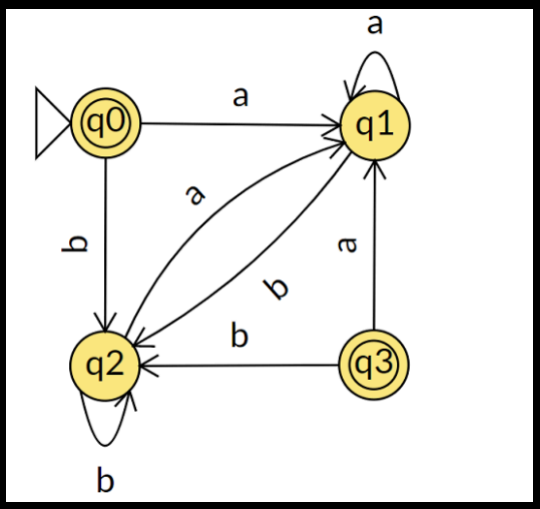
Sub-Concept:NFA/DFA

Marks: +1

Type: NAT

Level:Easy

Q10:How many different strings does this DFA accept?



Concept:CFG/DFA

Sub-Concept:CFG/DFA

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q11:Consider the following Statements:

S-1:For every language L, the language L^* is infinite

S-2:If a language L is finite, the complement of L is context-free.

A)only S-2 is true

B)Both S-1 and S-2 are false

C)only S-1 is true.

D)Both S-1 and S-2 are true

Concept:=DFA

Sub-Concept:Concatenation

Marks: +1

Type: NAT

Level:moderate

Q12:Let A = {a, ab} and B = {a, ba} be two languages. How many strings are in A.B?

Concept:CFG/DFA

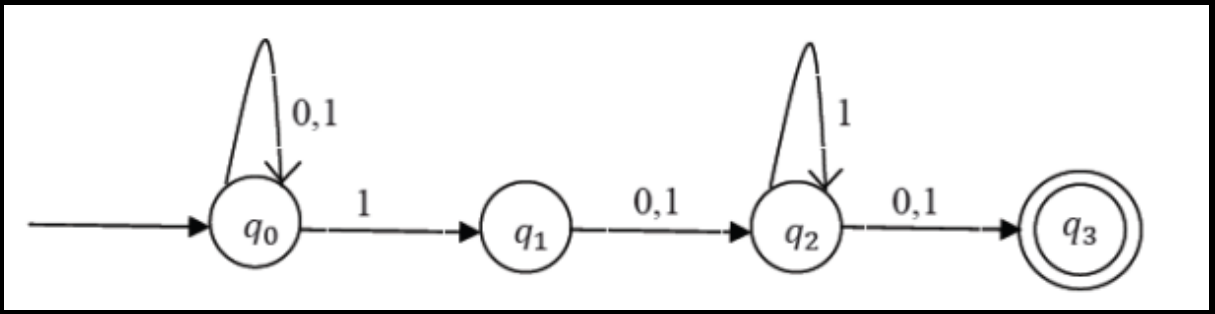
Sub-Concept:CFG/DFA

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q13:What is the set of reachable states for input string 0011?



A){q0, q1, q2, q3}

B){q0, q1, q2}

C){q1, q2}

D){q0, q1}

Concept:TOC

Sub-Concept:TOC

Marks: +1

Type: MSQ

Level:moderate

Q14:Which of the following is/are true?

A)The class of regular languages is closed under union

B)The class of regular languages is closed under concatenation.

C)Every NFA has an equivalent DFA.

D)The class of regular languages is closed under Kleene-star.

Topic:TOC

Concept:PDA

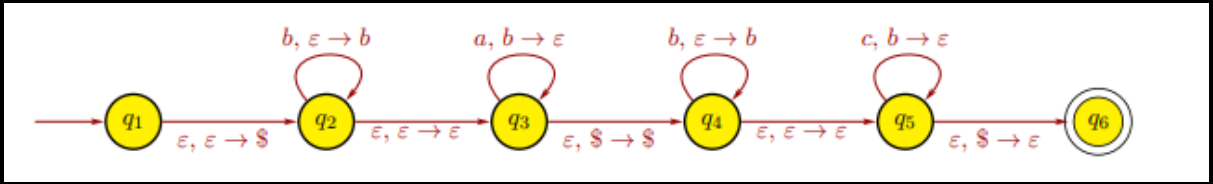
Sub-Concept:PDA

Marks: +2

Type: NAT

Level:moderate

Q15:A PDA is D is given below



How many of the following Strings are accepted by the above PDA?

b, bbaa, babbcc, bac, bbabbccc, bc, bbcc

Topic:TOC

Concept:Language

Sub-Concept:Closure property

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q16:Is the set of non-regular languages closed under intersection?

A)Yes, because the set of regular languages is closed under intersection.

B)No, because the set of regular languages is closed under intersection.

C)Yes, because there are two disjoint non-regular languages. D)No, because there are two disjoint non-regular languages

Topic:TOC

Concept:Language

Sub-Concept:Language

Marks: +1

Type: MSQ

Level:moderate

Q17:Consider the language L = $\{0^n1^m : n>=4, 0<=m<=2\}$. Which of the following statement(s) are correct regarding L?

A)L is a regular language

B)L is a context free language

C)L is a context free language but not a regular language

D)L is an infinite language

Sub-Concept:CFG

Marks: +1

Type: MSQ

Level:moderate

Q18:Consider the grammar G =(V,Σ,P,S) defined on the alphabet Σ={a, b, 0, 1}, the variables V={S, T, U}, the start symbol S and P given below. Identify all the strings in the options which belong to the language defined by this grammar.

$$
\begin{aligned}
&S \rightarrow TU \\
&T \rightarrow 0T1 \\
&U \rightarrow aUb \\
&T \rightarrow \varepsilon \\
&U \rightarrow \varepsilon
\end{aligned}
$$

A)ε

B)000011111ab

C)01aabb

D)aabb

Concept:DFA/CFG

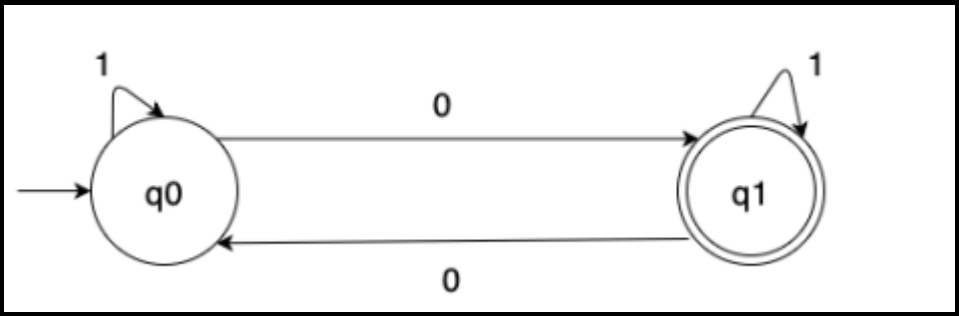
Sub-Concept:DFA/CFG

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q19:Consider the following DFA that identifies the language containing an odd number of 0's. Which is the correct set of rules R, from among the following for the CFG given by G =(V,Σ,R,S) where V={S0, S1}, Σ={0,1} and S=S0(start variable) equivalent to this DFA?



$(1)\ S_0 \rightarrow 0S_0$
$(2)\ S_0 \rightarrow 0S_1$
$(3)\ S_0 \rightarrow 1S_0$
$(4)\ S_0 \rightarrow 1S_1$
$(5)\ S_1 \rightarrow 0S_0$
$(6)\ S_1 \rightarrow 0S_1$
$(7)\ S_1 \rightarrow 1S_0$
$(8)\ S_1 \rightarrow 1S_1$
$(9)\ S_0 \rightarrow \epsilon$
$(10)\ S_1 \rightarrow \epsilon$

A)(1), (2), (5), (6) and (9)

B)(1), (4), (6), (7) and (9)

C)(2), (3), (5), (8) and (10)

D)(3), (4), (7), (8) and (10)

Concept:Grammar

Sub-Concept:Grammar

Marks: +1

Type: MSQ

Level:moderate

Q20:Which of the following grammars define the language containing all strings defined by the regular

expression {a,b}*?

A)S→SS | a | b | ε

B)S→a | b | ε

C)S→a | b

D)S→SSS | a | b | ε

Topic:TOC

Concept:RE

Sub-Concept:RE

Marks: +1,-0.33

Type: MCQ

Level:moderate

Q21:Consider the following Statements:

S-1: The class of recursively enumerable languages is closed under union.

S-2:The class of recursively enumerable languages is closed under intersection.

A)only S-2 is true

B)Both S-1 and S-2 are false

C)only S-1 is true.

D)Both S-1 and S-2 are true

Topic:TOC

Concept:Decidability

Sub-Concept:Decidability

Marks: +2

Type: MSQ

Level:moderate

Q22:Which of the following is/are decidable?

A)L1 = {<D, w> : D is a DFA and w $\notin$ L(D)}

B)L2={<N,w> : N is a NFA and w $\in$ L(N)}

C)L3 = {<P, w> : P is a PDA and w $\in$ L(P)}

D)L4 = {<M, w> : M is a TM and w $\in$ L(M)}

Sub-Concept:TOC

Marks: +2,-0.66

Type: MCQ

Level:moderate

Q23:Consider the following Statements:

S-1: L_1={<D, Q> | D and Q are DFAs and L(D) $\cap$ L(Q) = $\varnothing$}

S-2:L_2= {<M> : M is a TM and M accepts the empty string}

Which of the following is true?

A)only L_1 is decidable

B)Both L_1 and L_2 are decidable

C)Both L_1 and L_2 are undecidable

D)only L_2 is decidable

Topic:TOC

Concept:PDA/CFG

Sub-Concept:PDA/CFG

Marks: +2

Type: MSQ

Level:moderate

Q24:Check all of the following that are true:

A)Any language recognized by a deterministic PDA can be recognized by a non-deterministic PDA

B)Any language recognized by a non-deterministic PDA can be recognized by a deterministic PDA

C)We can construct a context free grammar for any

language recognized by a deterministic PDA

D)We can construct a context free grammar for any language recognized by a non-deterministic PDA

Concept:PDA

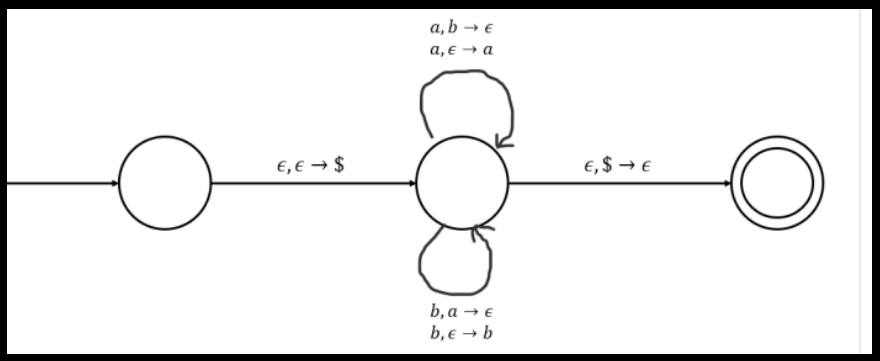
Sub-Concept:PDA

Marks: +1

Type: MSQ

Level:moderate

Q25:Which of the following strings are accepted by the PDA below?



A)ε

B)a

C)ab

D)ba

Answers

A1. B

A2. A,B,C

A3. C

A4. A

A5. B,C

A6. A,B,D

A7. A,B,D

A8. B,C

A9. D

A10. 1

A11. A

A12. 3

A13. B

A14. A,B,C,D

A15. 4

A16. D

Consider 2 languages L1={1^k 0 q^k, k>0} and L2={0^k 1 0^k, k>0}. Clearly, both these languages are non-regular. Further, they also have no strings in common, meaning that their intersection will give us the empty language, which we know is finite!

A17. A,B,D

A18. A,C,D

A19. C

A20. A,D

A21. D

A22. A,B,C

A: We know the complement of L1 is decidable, so does L1.

B:We can convert a NFA N to a DFA, and hence L2 reduces to L1

C:Similar to L1

D:Undecidable, but recognizable

A23. A

A24. A,C,D

A25. A,C,D