Which of the following statements is true?

a) If a language is context-free it can always be accepted by a deterministic push- down automaton
b) The union of two context-free languages is context-free
c) The intersection of two context-free languages is context-free
d) The complement of a context-free language is context-free

- A
- B
- C
- D

The language accepted by a push-down automaton is limited to 10 items is best described as

a) context-free
b) regular
c) deterministic context-free
d) recursive

- A
- B
- C
- D

Let $G = (\{S\}, \{a, b\}\ R, S)$ be a context-free grammar where the rule set R is $S \rightarrow aSb|SS|\varepsilon$

Which of the following statements is true?

a) G is not ambiguous
b) There exist $X, Y \in L(G)$ such that $xy \notin L(G)$
c) There is a deterministic push-down automaton that accepts $L(G)$
d) We can find a deterministic finite state automaton that accepts $L(G)$

- A
- B
- C
- D

Let $M = (K, \Sigma, \Gamma, \Delta, s, F)$ be a pushdown automaton, where $K = (s, f)$ $F = \{f\}$, $\Sigma = \{a, b\}$, $\Gamma = \{a\}$ and $\Delta = \{((s, a, \varepsilon), (s, a)), ((s, b, \varepsilon), (s, a)), ((s, a, \varepsilon), (f, \varepsilon)), ((f, a, a), (f, \varepsilon)), ((f, b, a), (f, \varepsilon))\}$

Which one of the following strings is not a member of L(M)?

a) aaa
b) aabab
c)baaba
d) bab

- A
- B
- C
- D

Let L be a regular language and M be a context-free language, both over the alphabet Σ . Let L^c and M^c denote the complements of L and M respectively.
Which of the following statements about the language $L^c \cup M^c$ is TRUE?
a) It is necessarily regular but not necessarily context-free.
b) It is necessarily context-free.
c) It is necessarily non-regular.
d) None of the above

- A
- B
- C
- D

6

In the context-free grammar below, S is the start symbol, a and b are terminals, and ε denotes the empty string $S \rightarrow aSa|bSb|a|b|\varepsilon$
Which of the following string is NOT generated by the grammar?
a) aaaa b) baba
c) abba d) babaaabab

- A
- B
- C
- D

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Which of the following languages is accepted by a non-deterministic pushdown automaton (PDA) but NOT by deterministic PDA?
a) $\{a^n b^n c^n | n \geq 0\}$
b) $\{a^l b^m c^n | l \neq m \text{ or } m \neq n\}$
c) $\{a^n b^n | n \geq 0\}$
d) $\{a^m b^n | m, n \geq 0\}$

- A
- B
- C
- D

Let L be a context-free language and M a regular language. Then the language $L \cap M$ is
a) always regular
b) never regular
c) always a deterministic context-free language
d) always a context-free language

- A
- B
- C
- D

Consider an ambiguous grammar G and its disambiguated version D. Let the languages recognized by the two grammars be denoted b y L(G) and L(D)respectively. Which one of the following is true?
a) $L(D) \subset L(G)$ b) $L(D) \supset L(G)$
c) $L(D) = L(G)$ d) L(D) is empty

- A
- B
- C
- D

The language $L = \{0^i 2 1^i | i \geq 0\}$ over the alphabet {0, 1, 2) s
a) not recursive
b) is recursive & is a deterministic CFL
c) is a regular language
d) is not a deterministic CFL but a CFL

- A
- B
- C
- D

Consider the following languages.
$L_1 = \{a^i b^j c^k | i = j,\ k \geq 1\}$
$L_2 = \{a^i b^j | j = 2i,\ i \geq 0\}$
Which of the following if true?
a) L_1 is not a CFL but L_2 is
b) $L_1 \cap L_2 = \phi$ and L_1 is non-regular
c) $L_1 \cap L_2$ is not a CFL but L_2 is
d) There is a 4 state PDA that accepts L_1, but there is no DPDA that accepts L_2

- A

- (•) B
- ( ) C
- ( ) D

Consider CFG with the following productions.
$S \rightarrow AA|B$
$A \rightarrow 0A|A0|1$
$B \rightarrow 0B00|1$
S is the start symbol, A and B are non-terminals and 0 and 1 are the terminals. The language generated by this grammar is
a) $\{0^n 10^{2n} | n \geq 1\}$
b)
$\{0^i\ 10^j\ 10^k | i, j, k \geq 0\} \cup \{0^n 10^{2n} | n \geq 1\}$ c)
$\{0^i\ 10^j\ | i, j, \geq 0\} \cup \{0^n 10^{2n} | n \geq 1\}$
d) The set of all strings over {0, 1} containing at least two 0's

- ( ) A
- (•) B
- ( ) C
- ( ) D

Which of the following are decidable?
1. Whether the intersection of two regular languages is infinite.
2. Whether a given context-free language is regular.
3. Whether two push-down automata accept the same language.
4. Whether a given grammar is context-free.

a) 1 and 2 b) 1 and 4
c) 2 and 3 d) 2 and 4

- ( ) A
- (•) B
- ( ) C
- ( ) D

Which one of the following is FALSE?
a) There is a unique minimal DFA for every regular language
b) Every NFA can be converted to an equivalent PDA
c) Complement of every context-free language is recursive
d) Every nondeterministic PDA can be converted to an equivalent deterministic PDA

- ( ) A
- ( ) B
- ( ) C
- (•) D

Let $L_1 = L_1 \cap L_2$, where L_1 and L_2 are languages as defined below

$L_1 = \{a^m b^m c\, a^n b^n \mid m, n \geq 0\}$

$L_2 = \{a^i b^j c^k \mid i, j, k \geq 0\}$

Then L is

a) not recursive
b) regular
c) context-free but not regular
d) recursively enumerable but not context-free

- A
- B
- C
- D

Which one of the following is false?

a) There is unique minimal DFA for every regular language
b) Every NFA can be converted to an equivalent PDA.
c) Complement of every context-free language is recursive
d) Every non-deterministic PDA can be converted to an equivalent deterministic PDA

- A
- B
- C
- D

Consider the languages $L_1 = \{0^i 1^j \mid i <> j\}$, $L_2 = \{0^i 1^j \mid i = j\}$, $L_3 = \{0^i 1^j \mid i = 2j + 1\}$, $L_4 = \{0^i 1^j \mid i \neq 2j\}$. Which one of the following statements is true?

a) Only L_2 is context-free
b) L_2 and L_3 are Context-free
c) L_1 and L_2 are context-free
d) All are context-free

- A
- B
- C
- D

Consider the languages L_1, L_2 and L_3 as given below

$L_1 = \{0^p 1^q \mid p, q \in N\}$

$L_2 = \{0^p 1^q \mid p, q \in N \text{ and } p = q\}$ and

$L_3 = \{0^p 1^q 0^r \mid p, q\, r \in N \text{ and } p=q=r\}$

Which of the following statements is not true?

a) Push Down Automata (PDA) can be used to recognize L_1 and L_2
b) L_1 is a regular language
c) All the three languages are context-free
d) Turing machines can be used to recognize all the languages

- A
- B
- C
- D

A

B

C

D

19

Consider the following languages.
$L_1 = \{0^p1^q0^r \mid p,q,r \geq 0\}$
$L_2 = \{0^p1^q0^r \mid p,q,r >= 0 \text{ and } p \neq r\}$
Which one of the following statements is false?
a) L_2 is context-free
b) $L_1 \cap L_2$ is context-free
c) Complement of L_2 is recursive
d) Complement of L_1 is context-free but not regular

A

B

C

D

Consider the following languages over the alphabet $\sum=\{0,1,c\}$
$L1 = \{0^n1^n \mid n \geq 0\}$
$L2 = \{wcw^r \mid w \in \{0,1\}^*\}$
$L3 = \{ww^r \mid w \in \{0,1\}^*\}$
Here, w^r is the reverse of the string w. Which of these languages are deterministic context free languages?
a) None of the languages
b) Only L_1
c) Only L_1 and L_2
d) All the three languages

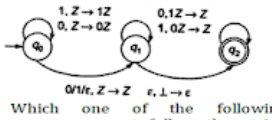
A

B

C

D

Consider the NPDA $\langle Q=\{q_0,q_1,q_2\}, \Sigma=\{0,1\}, \Gamma = \{0,1,\perp\}, \delta, q_0, \perp, F=\{q_2\}\rangle$, where (as per usual convention)Q is the set of states, Σ is the input alphabet, Γ is stack alphabet, δ is the state transition function, q_0 is the initial state, $\perp$ is the initial stack symbol, and F is the set of accepting states, The state transition is as follows:



Which one of the following sequences must follow the string 101100 so that the overall string is accepted by the automaton?
(a) 10110 (b) 10010
(c) 01010 (d) 01001

A

B

C

D

Which of the following languages are context-free?
$L_1 = \{a^m b^n a^n b^m \mid m,n>=1\}$
$L_2 = \{a^m b^n a^m b^n \mid m,n>=1\}$
$L_3 = \{a^m b^n \mid m = 2n+1\}$
a) L1 and L2 only
b) L1 and L3 only
c) L2 and L3 only
d) L3 only

- A
- B
- C
- D

Language L_1 is defined by the grammar:
$S_1 \rightarrow aS_1b|\varepsilon$
Language L_2 is defined by the grammar:
$S_2 \rightarrow abS_2|\varepsilon$
Consider the following statements:
P : L_1 is regular
Q : L_2 is regular
Which one of the following is TRUE?
a) Both P and Q are true
b) P is true and Q is false
c) P is false and Q is true
d) Both P and Q are false

- A
- B
- C
- D

Consider the following context-free grammars:
G_1: S→aS|B, B→b|bB
G_2: S→aA|bB, A→aA|B|ε, B→bB|ε
Which one of the following pairs of languages is generated by G_1 and G_2, respectively?
a) $\{a^m b^n | m>0$ or $n > 0\}$ and $\{a^m b^n | m > 0$ and $n > 0\}$
b) $\{a^m b^n | m>0$ and $n>0\}$ and $\{a^m b^n | m > 0$ or $n\geq 0\}$
c) $\{a^m b^n | m\geq 0$ or $n > 0\}$ and $\{a^m b^n | m > 0$ and $n > 0\}$
d) $\{a^m b^n | m\geq 0$ and $n>0\}$ and $\{a^m b^n | m>0$ or $n>0\}$

- A
- B
- C
- D

Consider the following languages:
$L1 = \{a^n b^m c^{n+m} : m, n \geq 1\}$
$L2 = \{a^n b^n c^{2n} : n \geq 1\}$
Which one of the following is TRUE?
a) Both L1 and L2 are context-free.
b) L1 is context-free while L2 is not context-free.
c) L2 is context-free while L1 is not context-free.
d) Neither L1 nor L2 is context-free

- A

- [x] B
- [ ] C
- [ ] D

A can do a piece of work in 21days. B is 50% more efficient than A. C is twice efficient than B. A started the work alone and worked for some days and left the work then B and C joined together and completed the work in 2 days. Then how many days does A worked alone?

- [ ] 7 Days
- [x] 12 Days
- [ ] 14 Days
- [ ] 21 Days

A can do a piece of work in 40 days B can do the same piece of work in 60 days. A and B started the work together in the first 15 days A worked with 50% of his efficiency, in the next 15days B worked with 50% of his efficiency. Now in how many days does the remaining work will be completed if both of them work with their full efficiencies?

- [ ] 1 Day
- [x] 1.5 Days
- [ ] 2 Days
- [ ] 2.5 Days

A can do a piece of work in 30 days, B can do in 45 days and C can do same work alone in 60 days. If on the first day A worked alone and on the second day A and B worked together and on the third day A and C worked together. If they repeat the cycle as follows then in how many days total work can be completed?

- [ ] 21 Days
- [ ] 21 7/8 Days
- [x] 21 5/6 Days
- [ ] 21 4/9 Days

A can do a piece of work in 21days. B is 50% more efficient than A. C is twice efficient than B. A started the work alone and worked for some days and left the work then B and C joined together and completed the work in 2 days. Then how many days does A worked alone?

- [ ] 7 Days
- [x] 12 Days
- [ ] 14 Days
- [ ] 21 Days

A car started from Indore to Bhopal at a certain speed. The Car missed an accident at 40Kms away from Indore, then the driver decided to reduce Car speed to 4/5 of the original speed. Due to this, he reached Bhopal by a late of 1hr 15min.Suppose if he missed an accident at 80Km away from Indore and from then he maintained 4/5 of original speed then he would reach Bhopal by a late of 1hour. Then what is the original speed of the Car?

- [ ] 20 km/hr

- [x] 40 km/hr
- [ ] 60 km/hr
- [ ] 80 km/hr

Two places A and B are at a certain distance. Ramu started from A towards B at a speed of 40 kmph. After 2 hours Raju started from B towards A at a speed of 60 kmph. If they meet at a place C then ratio of ratio of time taken by Raju to Ramu to reach Place C is 2:3. Then what is the distance between A and B?

- [ ] 300 Km
- [ ] 400 Km
- [x] 480 Km
- [ ] 600 Km

Ramu started from A towards B at a speed of 20Km/hr and Raju started from B towards A. They crossed each other after one hour. Raju reached his destination 5/6 hour earlier than Ramu reached his destination. Then what is the distance between A and B?

- [ ] 40 Km
- [x] 50 Km
- [ ] 60 Km
- [ ] 80 Km

A man traveled 100 km by Bike in 2 hours. He then traveled in Bus for 8 hrs and then Train in 9 hrs. Ratio of Speeds of Bus to Train is 4:5. If speed of train is 4/5 of Bike speed then the entire journey covered by him in Km is?

- [ ] 516 Km
- [ ] 616 Km
- [x] 716 Km
- [ ] 816 Km

A police saw a Thief at a distance of 2km. When Police started chasing him Thief also started running. If the ratio of Speeds of Police to Thief is 5:4. Then thief was caught at a certain distance then how many Kms did police run to catch the Thief?

- [ ] 5 Km
- [ ] 6 Km
- [ ] 8 Km
- [x] 10 Km

A father left a will of Rs.55 lakhs between his two sons aged 8.5 and 16 such that they may get equal amounts when each of them reach the age of 21 years. The original amount of Rs.55 lakhs has been instructed to be invested at 10% p.a. SI. How much did the elder son get at the time of the will?

- [ ] 25 Lakh
- [ ] 26 Lakh
- [ ] 28 Lakh
- [x] 33 Lakh

From a pack of 52 cads, 2 cards are drawn at random. What is the probability of drawing such that there is at least 1 king?

- 35/256
- 33/220
- 33/221
- 23/190

A box contains 6 blue, 5 green and 4 red balls. If two balls are pick at random, then what is the probability that neither is blue?

- 10/21
- 12/35
- 3/5
- 11/21

A box contains 5 blue and 5 white balls. What is the probability of drawing 2 balls such that both are same in color?

- 4/9
- 4/7
- 1/5
- 7/12

A committee of 4 people is to be formed from 3 men, 2 women and 4 children. What is the probability that exactly two of chosen people are children?

- 13/21
- 10/31
- 5/21
- 10/21

In a class 30% of the students opt for Math, 20% opt for Computers and 10% opt for both. A student is selected at random, find the probability that he has opted either Math or Computers.

- 3/5
- 2/5
- 4/9
- 6/11

Find out which part of the following sentences has an error. If there is no error, your answer should be ‘No Error’.My father likes Eliot’s essays who was a masterpiece critic and reputed grammarian of English.

- My father likes
- Eliot’s essays who was a
- masterpiece critic and reputed grammarian of English.
- No error

Find out which part of the following sentences has an error. If there is no error, your answer should be ‘No Error’.The Principal is displeased with us because he does not understand why we object to him coming with Mohan.

- The Principal is displeased
- with us because
- he does not understand why we
- object to him coming with Mohan.

Find out which part of the following sentences has an error. If there is no error, your answer should be ‘No Error’.Mr. Prakash told his staff that each of them should be able to carry out the work himself in time.

- Mr. Prakash told his staff
- that each of them
- should be able to carry out the work himself in time.
- No error

Find out which part of the following sentences has an error. If there is no error, your answer should be ‘No Error’.In the local cement company there are no less than two lakh workers about the four times needed to produce the same products.

- In the local cement company there are
- no less than two lakh workers
- about the four times
- needed to produce the same products.

Find out which part of the following sentences has an error. If there is no error, your answer should be ‘No Error’. I do not like these kind of pens which have been bought from the market.

- I do not like these kind
- of pens which have
- been bought from the market.
- No error

Change the voice of the sentence. Select the correct option from the sentence below. She has preserved all the old letters of her dead lover.

- All the old letters of her dead lover have been preserved by her.
- All the old letters of her dead lover has been preserved by her.
- All the old letters have been preserved.
- The letters of her old lover have been preserved.

Change the voice of the sentence. Select the correct option from the sentence below. Champagne is drunk on New Year’s Eve.

- People drink champagne on New Year’s Eve.
- Let us drink champagne on New Year’s Eve.
- They will drink champagne on New Year’s Eve.
- People always drink champagne on New Year’s Eve.

Change the voice of the sentence. Select the correct option from the sentence below. She bought a pearl necklace.

- (●) A pearl necklace was bought by her.
- ( ) A pearl necklace had been bought by her.
- ( ) A pearl necklace had been bought for her by him.
- ( ) A pearl necklace was bought for her.

Pointing to a photograph, Sahil said, “She is the mother of my son’s wife’s daughter”. How is Sahil related to lady?

- ( ) Son
- ( ) Uncle
- ( ) Father
- (●) Father-in-law

There are 5 friends A, B, C, D and E standing randomly. B is to the northeast of E. D is 2km to the east of E, who is 6km to the west of A. C is to the northwest of D and in the line of EB. D is 4km the south of B. In which direction is C with respect to A ?

- ( ) South west
- ( ) South east
- ( ) Northeast
- (●) Northwest