CS & IT ENGINEERING

Theory of Computation

Push Down Automata

CFL (Closure properties)

DPP 05 (Discussion Notes)

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01 Question

02 Discussion

Q.1 The intersection of CFL and a regular language will be [MCQ]

A. Always regular

B. Always CFL

C. Always not regular

D. None of these

$CFL \cap Reg \Rightarrow CFL$
(may or may not reg)

Q.2

Consider the following grammars G_1, G_2 and G_3:

G_1: $S \to P\,Q$
$P \to 0\,P\,1 \mid \epsilon$
$Q \to 1\,Q\,2 \mid \epsilon$

G_2: $S \to 0\,S\,1 \mid Q$
$P \to 1\,Q\,2 \mid \epsilon$

G_3: $S \to P\,Q \mid Q$
$P \to 0\,P\,1 \mid 01$
$Q \to 1\,Q\,2 \mid \epsilon$

Here, {S,P,Q} are variables where S is start symbol. {0,1,2} are terminals.

Which of the following is true?

A. G_1 and G_2 are equivalent.

B. G_1 and G_3 are equivalent.

C. G_2 and G_3 are equivalent.

D. None of these.

Q.3 Consider the following regular expressions P, Q and R over Σ = {a, b}: [MSQ]

$P = ab + aQ + bR$

$Q = baQ + bR$

$R = Raba + a$

Which of the following regular expression will produce all the strings accepted by above regular expression?

$R \rightarrow Raba + a$

$R = a(aba)^*$

$Q = (ba)^* ba(aba)^*$

$P = ab + a(ba)^* ba(aba)^* + ba(aba)^*$

$x x^* = x^+$

$x^* x = x^+$

A. $ab + ba(aba)^* [\in + a(ba)^*]$

B. $ab + [\in + a(ba)^*] ba(aba)^*$

C. $ab + a(ba)^* ba(aba)^*$

D. $ab + a(ba)^* (aba)^* + ba(aba)^*$

Q.4 [MCQ]

Consider the following languages

L_1 = Context free language.

L_2 = Deterministic context free language.

L_3 = Context sensitive language.

L_4 = Regular

Which of the following is incorrect?

A. $L_2 . L_4$ is always DCFL. → TRUE

B. $L_1 \cap L_3$ is CSL. → TRUE

C. $\Sigma^* - L_3$ is CSL. → TRUE

D. None of the above.

Q.5 Consider the following push down automata. [MCQ]

PDA = $\{Q, \Sigma, \delta, \Gamma, q_0, Z_0, q_f\}$

$\$ Z_0 \mid Z_0$

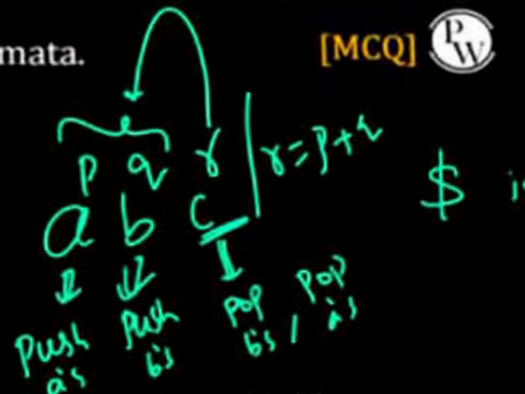
Which of the following language is accepted by above PDA?

A. $L = \{a^*\} \cup \{a^p b^q c^r \mid p, q, r \geq 1, p + q = r\}$

B. $L = \{a^{p+q} b^{q+r} \mid p, q, r \geq 0\}$

C. $L = \{a^p b^q c^r \mid p, q, r \geq 1\}$

D. None of these.



Q.6 [MSQ]

Consider the following language:

$L_1 = \{ab^n a^{2n} \mid n \geq 1\}$

$L_2 = \{aab^n a^{3n} \mid n \geq 1\}$

Which of the following is correct?

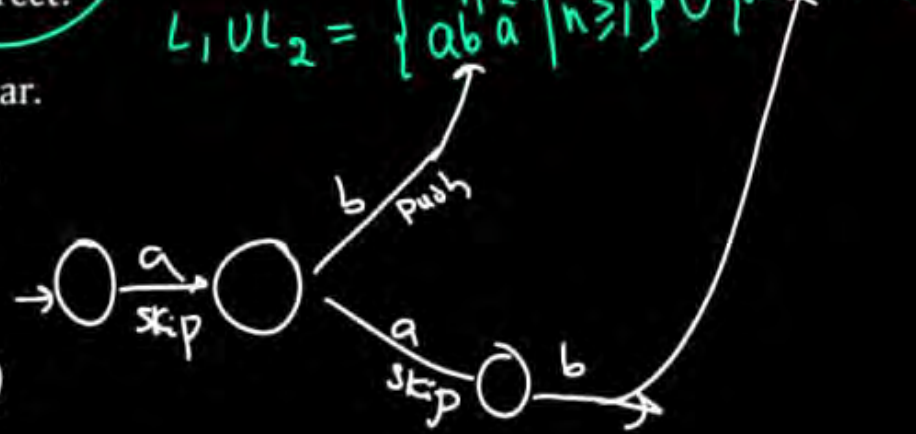
A. $L_1 \cup L_2$ is DCFL but not regular.

B. $L_1 \cup L_2$ is CFL but not DCFL.

C. $L_1 \cup L_2$ is CSL but not CFL.

D. $L_1 \cup L_2$ is DCFL and also CFL.

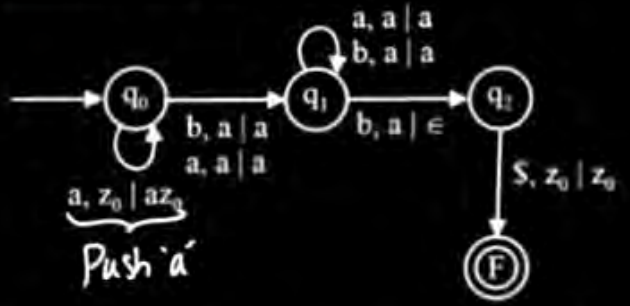
$L_1 \cup L_2 = \{ab^n a^{2n} \mid n \geq 1\} \cup \{aab^n a^{3n} \mid n \geq 1\}$



ab...

aa...

Q.7 Consider the following PDA: [MCQ]



Here q_0 is a starting state and F is a final state. Then the language accepted by above PDA is?

A. Regular but finite

B. Regular but infinite

C. CFL but not regular

D. None of these

$a(a+b)^+ b$

Q.8 Suppose, L is any CFL language on alphabet $\Sigma = \{a, b\}$, and the following language: [MSQ]

$L_1 = L - \{w\,x\,w^R \mid w, x \in \{a,b\}^*\}$

$L_2 = L_1 \cdot L$

$L_3 = \overline{L} \cup L = \Sigma^*$

$L_1 = L - (a+b)^* = \phi$

$L_2 = L_1 \cdot L = \phi \cdot L = \phi$

$L_3 = \Sigma^*$

Which of the following is/are correct?

A. L_1 is finite.

B. L_2 is CFL.

C. L_3 is regular.

D. None of these.


THANK YOU GW
SOLDIERS !