CS & IT ENGINEERING

Theory of Computation

Push Down Automata

context-free Languages

DPP 01

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[MCQ]

#Q. Suppose L_1 is a finite language and L_2 is non-regular language then $L_1 \cap L_2$ will be:

finite $\wedge$ non-reg $\rightarrow$ finite $\downarrow$ regular

A Regular but infinite

B Non-regular

C Finite and regular

D None of these

[NAT]

#Q. Consider the following statements:

(i) All finite language are context free language.

(ii) All regular language are finite.

(iii) All DCFL are finite.

(iv) All regular language are DCFL

(v) There exists some language which are finite and irregular.

The number of correct statements from the above statements are 2.

[MCQ]

#Q. Consider the following languages.

$L_1 = \{a^n b^n \mid n \geq 0\} \rightarrow$ DCFL

$L_2 = \{a^n b^m c^k \mid n, m, k \geq 0 \wedge (n \neq m) \vee (m \neq k)\}$ CFL but not DCFL

Which of the following statements is correct?

A. L_1 is CFL and L_2 is DCFL

B. L_1 is DCFL and L_2 is CFL

C. L_1 and L_2 both are DCFL

D. None of these.

[MSQ]

(A, B, C)

#Q. Which of the following grammar is/are generating DCFL but not regular language?

$\{a^n b^n\}$

A. $S \to \underline{aa}\, S\, \underline{bb} \mid \epsilon$

B. $S \to a\, S\, bb \mid \epsilon$

$\{a^n b^{2n}\}$

C. $S \to aa\, S\, b \mid \epsilon$

$\{a^{2n} b^n\}$

D. $S \to \underline{ab}S \mid \epsilon$

$(ab)^*$

[MCQ]

#Q. Consider the following languages:

$L_1 = \{a^m b^n c^k \mid \text{if } (m = \text{even}) \text{ then } (n = k)\}$ → DCFL

$L_2 = \{a^n c b^n\} \cup \{a^n d b^n\}$ → DCFL

Which of the following is correct statement?

A. Only L_1 is DCFL.

B. Only L_2 is DCFL.

C. Both L_1 and L_2 are CFL but not DCFL

D. Both L_1 and L_2 are DCFL but not regular.

[MCQ]

$xx^R yy^R$

CFL.CFL = CFL

#Q. Consider the following grammar:

$S \rightarrow AB$

$A \rightarrow a\,A\,a \mid b\,A\,b \mid \epsilon$ $xx^R \rightarrow$ CFL

$B \rightarrow a\,B\,a \mid b\,B\,b \mid \epsilon$ $yy^R \rightarrow$ CFL

Which of the following is correct regarding above grammar?

A ✗ Language produced by S is $L = \{xx^R yy^R \mid x, y \in \{a, b\}^*\}$ and L is DCFL but not regular.

B ✓ Language produced by S is $L = \{xx^R yy^R \mid x, y \in \{a, b\}^*\}$ and L is CFL but not DCFL.

C ✗ Language produced by S is $L = \{xx^R yy^R \mid x, y \in \{a, b\}^*\}$ and L is DCFL.

D None of the above.

[MCQ]

#Q. The intersection of CFL and a regular language will be

A. Always regular

B. Always CFL

C. Always not regular

D. None of these

CFL ∩ regular → always CFL.

may (or) may not regular

[MCQ]

$0^n 1^n 1^m 2^m = 0^n 1^{n+m} 2^m$

#Q. Consider the following grammars G_1, G_2 and G_3:

G_1:
$S \rightarrow PQ \mid P \mid Q$
$P \rightarrow 0P1 \mid \epsilon$ — $0^n 1^n$
$Q \rightarrow 1Q2 \mid \epsilon$ — $1^m 2^m$

G_2: ✗
$S \rightarrow 0S1 \mid Q$ → $0^n 1^m 2^m 1^n$
$P \rightarrow 1Q2 \mid \epsilon$ — $1^m 2^m$

G_3:
$S \rightarrow PQ \mid Q \mid P$.
$P \rightarrow 0P1 \mid 01 \mid \epsilon$ — $0^n 1^n$
$Q \rightarrow 1Q2 \mid \epsilon$ — $1^m 2^m$

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

[MCQ]

CSL ∧ CSL → CSL

CSL ∧ CFL

DCFL . regular

DCFL . DCFL

#Q. Consider the following language.

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. → false

B. $L_1 \cap L_3$ is CSL. – true

C. $\Sigma^* - L_3$ is CSL. – true

D. None of the above.

[MCQ]

#Q. Consider the following push down automata.

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

$a^* \cup a^n b^m c^{n+m}$

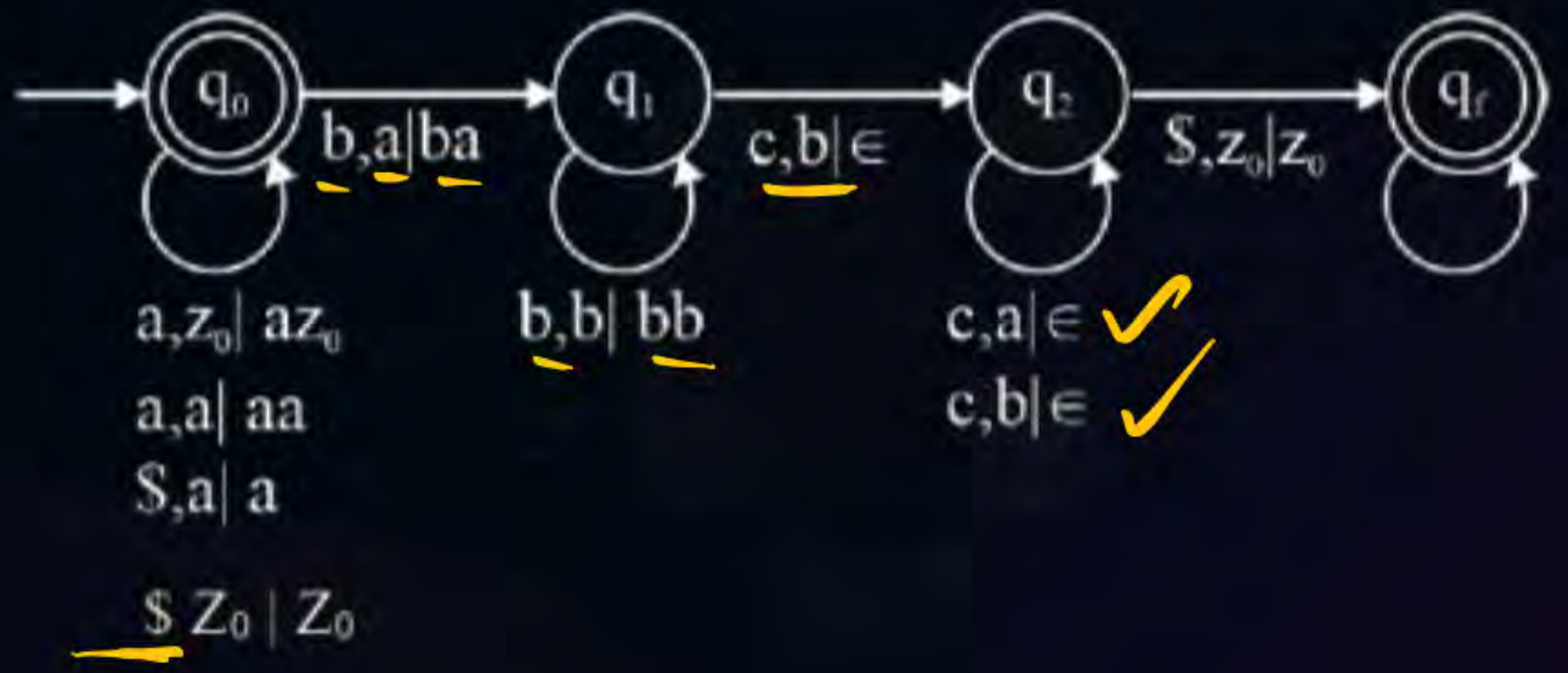
Which of the following language is accepted by above PDA?

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

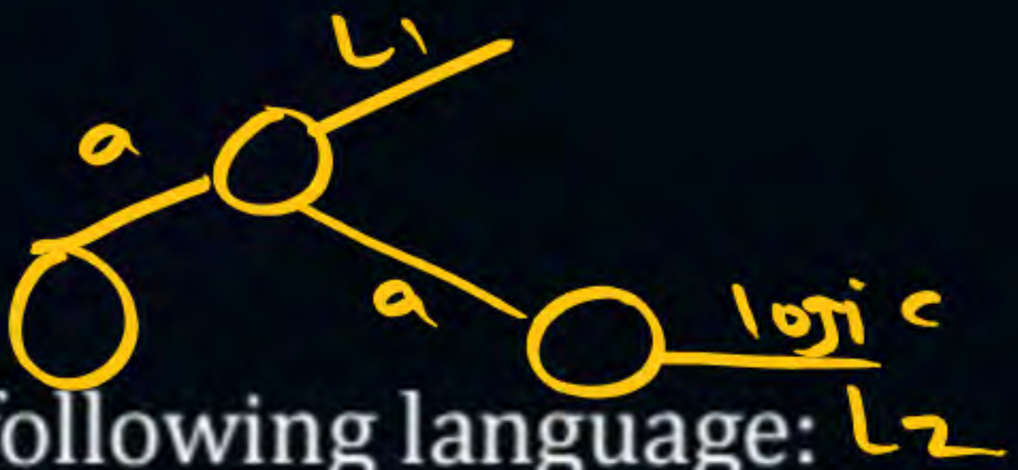
B $L = \{a^{p+q} b^{q+r} \mid p, q, r \geq 0\}$

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

D None of the above



[MSQ]



#Q. Consider the following language:

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

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

Which of the following is correct?

(A, D)

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.

[MSQ]

#Q. Suppose, L is any CFL language on alphabet

$\Sigma = \{a, b\}$, and the following language:

$L_1 = L - \underbrace{\{w\,x\,w^R \mid w, x \in \{a,b\}^*\}}_{(a+b)^*}$ $-\ \phi$

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

$L_3 = \bar{L}_1 \cup L$ $= \Sigma^*$

$\Sigma^* \cup L =$

(A, B, C)

Which of the following is/are correct?

A L_1 is regular

B L_2 is CFL.

C L_3 is regular.

D None of these

THANK - YOU