CS & IT ENGINEERING

Theory of Computation

Push Down Automata

DPP 03 **Discussion** Notes

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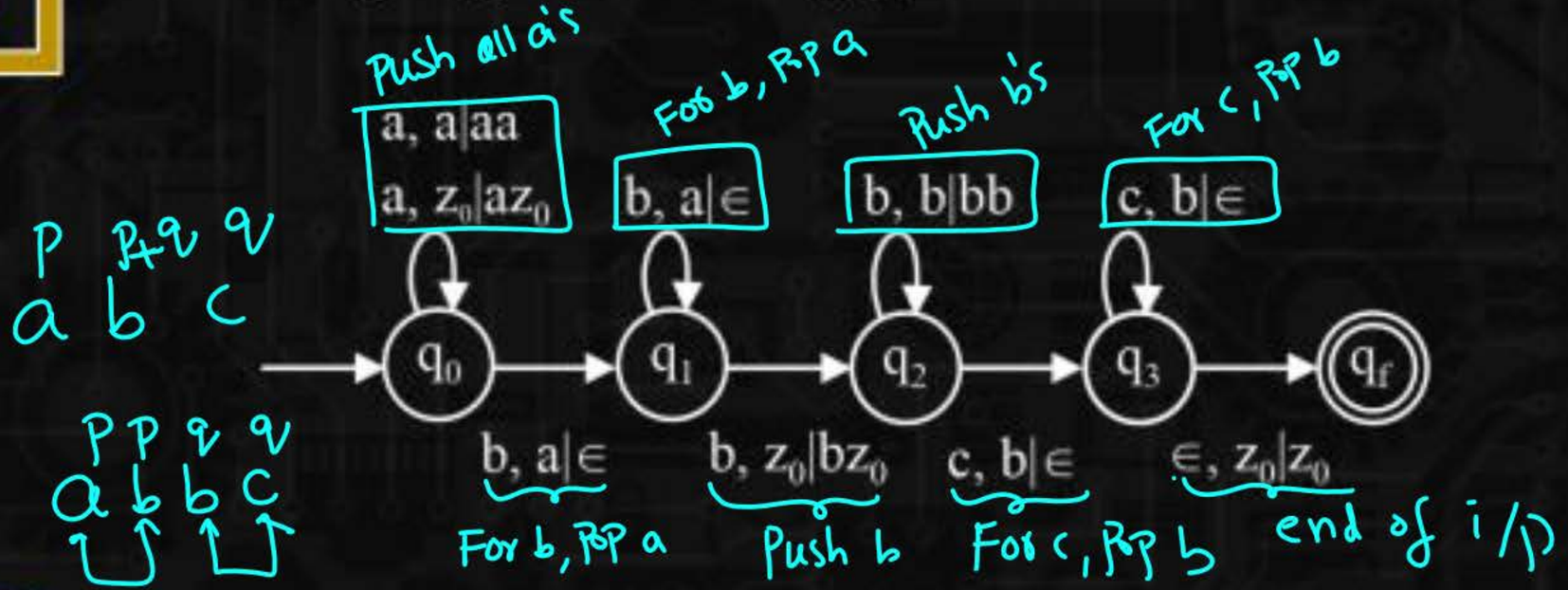
01 Question

02 Discussion

Q.1 The language derived by given PDA is

[MCQ]



A. $L = \{a^n b^m c^k \mid n = m + k, m, n, k \geq 0\}$.

B. $L = \{a^m b^n c^k \mid k = m + n, m, n, k \geq 1\}$.

C. $L = \{a^m b^n c^k \mid k = m + n, m, n, k \geq 0\}$.

D. $L = \{a^m b^n c^k \mid n = m + k, m, n, k \geq 1\}$.

Q.2 [NAT]

Consider the following statements:

(i) For every NFA N there exists a minimal DFA(N) such that L(N) = L(M).

(ii) For every DFA M there exists a DPDA P such that L(M) = L(P).

(iii) For every DPDA P there exists a NPDA N such that L(P) = L(N).

(iv) For every NPDA 'N' there exists a DPDA 'P' such that L(N) = L(P).

The number of correct statements is ___.

= 3

Q.3 Let $r_1 = (01^*)^*$ is any regular expression. Then which of the following regular expression represents r_2 such that $L(r_1) = L(r_2)$.

[MCQ]

A. $(10^*)^*$ ← ε ✓, 0 ✗

B. $(1^* + 01^*1)^*$ ← ε ✓, 0 ✓, 00 ✗

C. $(0^* + 01^*1)^*$ ← ε ✓, 0 ✓, 00 ✓, 01 ✓

D. None

$r_1 = (01^*)^*$

$L(r_1) = \{\varepsilon, 0, 00, 01, \cancel{10}, \cancel{11}, \ldots\}$

$= \varepsilon + 0\cancel{X}$

Q.4

[MCQ]

Consider a, PDA M as defined below:

$M = \{\{q_0, q_1, q_2, q_3, q_4\}, \{a, b\}, \{a, b, z_0\}, \delta, q_0, \{q_4\}\}$ where δ is defined by

Push a: $\delta(q_0, a, z_0) = \{(q_1, az_0)\}$

Push a: $\delta(q_1, a, a) = \{(q_1, aa)\}$

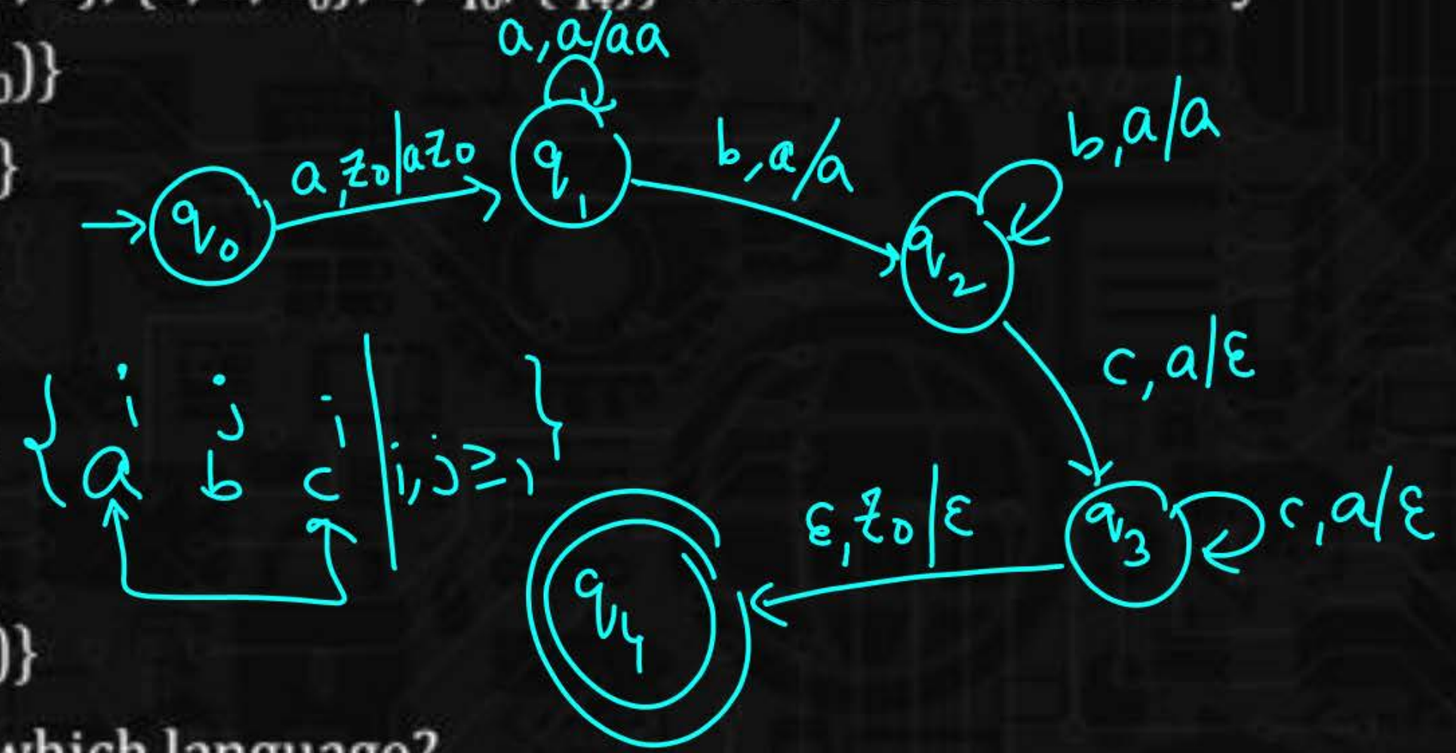
skip b: $\delta(q_1, b, a) = \{(q_2, a)\}$

skip b: $\delta(q_2, b, a) = \{(q_2, a)\}$

Pop a: $\delta(q_2, c, a) = \{(q_3, \in)\}$

Pop a: $\delta(q_3, c, a) = \{(q_3, \in)\}$

$\delta(q_3, \in, z_0) = \{(q_4, \in)\}$



The above PDA accepts which language?

A. $L(M) = \{a^n b^n c^m \mid n \geq 1, m \geq 0\}$

B. $L(M) = \{a^n b^m c^n \mid n \geq 1, m \geq 0\}$

C. $L(M) = \{a^n b^m c^m \mid n \geq 1, m \geq 0\}$

D. $L(M) = \{a^m b^m c^n \mid n \geq 1, m \geq 1\}$

Q.5

[MCQ]

Consider the following grammar G:

G:

$S \rightarrow SS \mid S$

$A \rightarrow aA$

$\Rightarrow L = \phi$

Here, S and A are variables and a is a terminal then the language generated by above grammar G is:

A. $L(G) = a^n$

B. $L(G) = a^*$

C. $L(G) = \phi$

D. $L(G) = a^n b a^n$

Q.6 Which of the following is/are context free language. **[MSQ]**

A. $L = \{a^m b^m c^n \mid m \geq 1 \text{ and } n \geq 1\}$ → CFL

B. $L = \{a^m b^m c^m \mid m \geq 0\}$ → not CFL

C. $L = \{wcw^R \mid w \in (a + b)^+\}$

D. All strings of balanced parenthesis

Q.7 [MCQ]

Consider the following language L:

$L = \{wcw^R \mid w \in (a+b)^*, c \in (a+b)\}$ $= \{w(a+b)w^R \mid w \in \{a,b\}^*\}$ → CFL but not DCFL

The complement of L will be ____.

A. Regular

B. DCFL but not regular

C. CFL but not DCFL

D. None of these

$\overline{\{ww^R \mid w \in \{a,b\}^*\}}$ → CFL

Q.8

[NAT]

Suppose, L is a language accepted by PDA.

(i) $L = \{a^n b^n c^m d^m \mid n, m \geq 1\}$ → DCFL

(ii) $L = \{a^n \mid n \text{ is prime}\}$ → not CFL

(iii) $L = \{ww^R \mid w \in (a + b)^+\}$ → CFL

Then how many of the following can be L_____.

= 2 //


THANK YOU GW
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